Food and Agriculture Organization of the United Nations

This project is funded by the European Union

The Forest Sector in Bosnia and Herzegovina

Preparation of IPARD Forest and Fisheries Sector Reviews in Bosnia and Herzegovina

22 January 2015

FAO Regional Office for Europe and Central Asia

Analysis of the Forest Sector in Bosnia and Herzegovina

EU funded project “Preparation of IPARD Forest and Fisheries Sector Reviews in Bosnia and Herzegovina”

Regional Office for Europe and Central Asia
Food and Agriculture Organization
of the United Nations

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of the Regional Office for Europe and Central Asia of the Food and Agriculture Organization of the United Nations and can in no way be taken to reflect the views of the European Union.

Contents

ABBREVIATIONS, ACRONYMS AND CURRENCY EQUIVALENTS

BAM	Bosnian Convertible Mark
BD	Brčko District
BiH	Bosnia and Herzegovina
ca	Circa
CFMC	Cantonal forest management companies
CFO	Cantonal Forest Office
EC	European Commission
EEA	European Environmental Agency
EU	European Union
EUR	Euro
EUTR	EU Regulation 995/2010
EUVET	European Union Vocational Education and Training
FADN	Farm Accountancy Data Network
FAO	Food and Agriculture Organization of the United Nations
FBiH	Federation of Bosnia and Herzegovina
FFI	FBiH Forest Inspection
FFO	FBiH Forest Office
FHI	Forest and Hunting Inspection
FIRMA	Fostering Interventions for Rapid Market Advancement
FMA	Forest Management Area
FMU	Forest Management Unit
FP	Forest Programme
FSC	Forest Stewardship Council
GDP	Gross domestic product
GFRA	Global Forest Resource Assessment
GOVOR	The adaptation of national forest policy systems in South-East European countries (Bosnia-Herzegovina, Croatia, Macedonia and Serbia) to new modes of international forest governance
ha	Hectare
HCVF	High Conservation Value Forest
INC	Initial National Communication
IPA	Instruments for Pre-Accession Assistance
IPARD	Instrument for Pre-Accession Assistance for Rural Development
JSC	Joint Stock Company
km^2	Square kilometre
m^3	Cubic meter
MAFWM RS	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
MAWMF FBiH	Ministry of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina
MEUR	Million Euros
MoFTER	Ministry of Foreign Trade and Economic Relations of BIH

NEAP	National Environmental Action Plan
NFI	National Forest Inventory
NWFP	Non wood forest products
PFMC	Private Forest Management Company
REU	FAO Regional Office for Europe and Central Asia
RS	Republika Srpska
SAA	Stabilization and Association Agreement
SFM	Sustainable forest management
SIDA	Swedish International Development Cooperation Agency
SWOT	Strengths, Weaknesses, Opportunities and Threats (analysis)
tce	tonne of coal equivalent
TFYRM	The Former Yugoslav Republic of Macedonia
thd	Thousand
toe	Ton of oil equivalent
UN	United Nations
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WC-BiH	Wood Cluster Association Bosnia and Herzegovina
WP&F	Cluster Wood Processing and Forestry Cluster

Introduction

This is one of the seven sector analyses (Meat and Dairy; Fruit and vegetables; Cereals; Wine; Diversification, Fishery and Aquaculture, and Forestry) that have been prepared since spring 2011 for the agricultural authorities in Bosnia and Herzegovina at state, entity and Brčko District level. The sector analyses are inputs to the design of measures to be financed under the European Union (EU) Instrument for Pre-accession Assistance for Rural Development (IPARD), once available, as well as for the design of the country's policies interventions in general.

The analyses were commissioned by the EU and monitored by the Delegation of the European Union to Bosnia and Herzegovina. The overall coordination of the studies was carried out by Gerold Bödeker, Lead Technical Officer, Regional Office for Europe and Central Asia of the Food and Agriculture Organization of the United Nations (FAO) in Budapest.

Report structure

The report is structured as follows:

After a general overview of Bosnia and Herzegovina, the forest sector is analysed using a very broad definition, comprising the forest production, the wood-processing industry, and forestry-related value chains. The main body of the report addresses the issues of (i) forest resources and management, (ii) land use and land use change, (iii) forest-based sector, (iv) forest-based value chains and services, (v) forest policy and governance, (vi) compliance with EU standards, and (vii) education and training.

Consequently, the results of two SWOT workshops that were conducted are described. In the final section there is an overall analysis leading to the identification of recommendations, priorities for action and investment needs.

Study team

This review was elaborated by Dr. Bernhard Wolfslehner, International Consultant and Dr. Mersudin Avdibegović, National Consultant under the day-to-day technical guidance of Dr. Norbert Winkler-Ráthonyi, Forestry Officer, REU and Kitti Horváth, Forestry Junior Technical Officer, REU.

Acknowledgements

The FAO team would like to extend its sincere thanks for the assistance and close collaboration in the implementation of the project to the following organizations and individuals:

- Delegation of the European Union to Bosnia and Herzegovina
- BiH Ministry of Foreign Trade and Economic Relations (MoFTER):
  Mr. Ljubisa Lalović
  Mr. Amir Lubovac
- Federation of BiH (FBiH), Ministry of Agriculture, Water Management and Forestry
  Ms. Semra Buza
- Republika Srpska (RS), Ministry of Agriculture, Forestry and Water Management
  Mr. Boris Marković
- Brčko District (BD), Department for Agriculture, Water Management, Forestry and Veterinary
  Ms. Ljiljana Zenunović
- Mr Vlado Pijunovic and Ms Amela Kozic, FAO
- Participants of the two SWOT workshops and the multitude of interviewees

1. Executive Summary

1.1 Background objectives and outcome

BiH is a potential candidate country for EU accession following the Thessaloniki European Council of June 2003. On 16 June 2008 the EU and BiH signed the Stabilization and Association Agreement (SAA) which will enter into force once its ratification process has been completed. An Interim Agreement on Trade and Trade-related issues, which was signed on the same day, entered into force on 1 July 2008[1].

Some provisions of the Stabilization and Association Agreement clearly state that "*Cooperation between the Parties shall focus on priority areas related to the Community acquis in the field of agriculture and veterinary and phytosanitary domains.*"[2]

After adoption of Council Regulation (EC) No. 1085/2006 establishing the Instrument for Pre-Accession Assistance (IPA) on 1 August 2006, coming into effect on 1 January 2007, the Framework agreement between BiH and the Commission of the European Communities on the rules for cooperation to implement EC financial assistance to BiH under the Instrument for Pre-Accession Assistance (IPA)[3] was signed, which was a major milestone on Bosnia and Herzegovina's road to Europe.
As a pre-candidate country, Bosnia and Herzegovina cannot yet take full advantage of IPA support. Preparations are being made and should be accomplished by the time Bosnia and Herzegovina becomes an EU candidate country, and when the implementation of the IPARD (Instrument for Pre-Accession Assistance for Rural Development) support for agricultural and rural development is initiated.

The main objective of the report is to provide a comprehensive analysis of the forest sector in Bosnia and Herzegovina. The report contributes to the analysis of the internal strengths and weaknesses as well as of the external opportunities and threats to the sector. In light of the needs and problems of the sector and the challenges ahead, investment needs are estimated and policy recommendations are formulated. In this way, the report contributes to the formulation of a number of possible policy interventions for agriculture and rural development policy in line with the needs for the development of the sector. The study presents:

- Background and key figures of the sector;
- Structural characteristics of the sector;
- Market and trade;
- Government policy for the sector at state and entity levels;
- Level of attainment of relevant EU standards;
- Development opportunities and related investment needs;
- Identification of potential and needs in the sector and provision for related recommendations.

The outcome of the sector review includes a transparent overview of the sector, an analysis of potential in the sector and obstacles to realizing this potential, as well as IPARD type measures and recommendations in order to target investments.

The forest sector analysis to be carried out in Bosnia and Herzegovina was selected based on the EU standard relevance as well as economic relevance. The importance was

1 http://ec.europa.eu/enlargement/potential-candidate-countries/bosnia_and_herzegovina/eu_bosnia_and_herzegovina_relations_en.htm
2 http://ec.europa.eu/world/agreements/prepare CreateTreatiesWorkspace/treatiesGeneralData.do?step=0&redirect=true&treatyId=7201
3 http://europa.ba/Default.aspx?id=15&lang=EN

highlighted at the final stakeholder workshop of project *Preparation of IPARD Sector Analyses in Bosnia and Herzegovina*, funded by the European Union.

1.2 Methodology

The main purpose of the sector analyses is to identify which segment/area/beneficiary should be targeted within each sector through the future IPARD programme in Bosnia and Herzegovina. The study will follow these steps:

- Development of workplan and methodology
- Structural description of the sector
- Regional variation and disparities
- Investment requirements and capacities
- Market potentials
- National policies and regulation
- SWOT analysis and benchmarking

Focusing on the following aspects:

- Forest resources and management
- Land use and land use change
- Forest-based sector including industries & Forest-based products, services and value chains
- Forest Policy and Governance
- Level of attainment of relevant EU standards
- Education and Qualification

1.3 Description of the sector

Forests represent one of the major natural resources of the country. Due to their natural and diverse structure, as well as extensive natural regeneration, they represent crucial resources for the further development of Bosnia and Herzegovina. The country itself is geographically excellently positioned in terms of diverse climatic influences (Mediterranean, sub Mediterranean and middle continental climate zones) and is home to over one hundred tree species. The main species found are fir, spruce, Scots and European pine, beech, various species of oak, and less significant numbers of noble broadleaves, including maples, elms, ash, together with fruit trees (cherry, apple, pear).

Professional development and management in the forest sector have focused on traditional systems, and has recently undergone changing demands in terms of contributing more to protecting and enhancing all important forest functions, ranging from economic viability, to social responsibility and environmental and ecological sustainability. In general, since the end of the war the forest-based sector has faced significant structural changes and needs strong modernization in order to be competitive on global markets.

According to latest data[4], forests and forest land in Bosnia and Herzegovina encompass an area of 3.231 million ha, which is around 63 percent of the total land area, one of the highest values in Europe. In terms of forest ownership, around 80 percent are public forests, and around 20 percent are privately owned.

1.4 Recommendations

The forest sector study started from a broad understanding of the sector, addressing not only the forestry production but also the forest-based value chain(s).

Based on the analysis the following recommendations are summarized along the lines of the IPARD structure and axes.

Following the measure of investments

4 Agency for Statistics Bosnia and Herzegovina www.bhas.ba

in agricultural holdings to restructure and upgrade to the EU standards, it is recommended to:

- Support sustainable forest management planning and revise forest management planning in both public and private forests using new forest inventory data;
- Establish new programmes for forest management planning in private forests;
- Establish fire management concepts and systems: this includes means for both fire prevention (e.g. fuel management, awareness rising campaigns) and fire-fighting (logistics, machinery, international cooperation).

Further, investments in processing and marketing, especially addressing the opportunities to create additional value across the forest-wood chain and to be used to generate better pre-condition for private investment, are recommended. It is recommended to:

- Support the establishment of regional horizontal and vertical marketing platforms of wood products and NWFP;
- Support the development of concepts and access to investment in modern sawmilling technology and logistic chains;
- Feasibility studies for the best locations for the creation of veneer / hardwood plywood, particleboard, MDF industries and investment opportunities;
- Feasibility studies for the best locations and investment opportunities in the bioenergy sector in BiH;
- Feasibility studies for the best locations and investment opportunities in wood pellet production, integrated heating systems, local and a distant heating systems, use of wood waste;
- Support an innovation programme with calls for pilot and demonstration projects for value adding wood processing and manufacture;
- Establishment of a web-based information platform on the forest-based sector for forest producers, traders, manufacturers and the public;
- Facilitation and exchange programmes for import of international know-how in wood-based industries;
- Establishment of new trainee programmes in wood-based industries;
- Exploration of climate change mitigation and carbon trading mechanisms as synergetic marketing options (e.g. REDD+), and respective information campaigns;
- Programme for making forest certification accessible for forest owners.

Support for setting up of producers' groups responds to the almost inexistent organization of private forest owners, which has been identified as one of the key issues for sustainable forest management practices, coherent wood mobilization, and proper representation of forest owners in the political process. It is recommended to support, among other things, a programme for financial and institutional support of private forest owners' associations (representation) and cooperatives (technical and marketing).

In terms of reparatory actions for implementation of the agri-environmental measures and LEADER, the following is recommended for the preparation for implementation of actions relating to environment and the countryside.

Since Forests in BiH constitute a major share of environmental resources, and are a major space for biodiversity conservation and management, as well as for water and welfare

provision, measure should be taken to:

- Support further pilots for future Natura 2000 implementation in forests for different holding size classes, public and private forests and develop prototypes for financing instruments;
- Develop concepts and examine hotspots areas for both biodiversity and biomass production in coppice forests;
- Run pilot projects on payment for ecosystem service schemes including contractual nature conservation, eco-tourism, water provision, carbon trading, etc.

Further, rural development strategies play an instrumental role for any IPARD implementation. Broadly speaking, the forest-based sector is subject to cross-thematic strategies and regulations. To ensure a coherent role in rural development, issues such as forest strategies, energy policies, spatial planning, environmental policies, and rural development strategies have to be streamlined and harmonized. For the reparation and implementation of local rural development strategies, it is recommended to:

- Establish a new programme for forest spatial planning including Inaccessible areas and create a priority list of forests to be made accessible;
- Reinforcement and harmonization of spatial planning instruments;
- Support of institutional changes and political processes by EU in the areas of spatial planning;
- Establishment of a priority plan for land mine clearance (in forest land);
- Support institutional mechanisms for combating illegal logging, and enforcement of a controlling and safeguarding system of illegal logging activities;
- Foster institutional platforms for strategic forest policy making across entities, support of implementation of a national forest programme;
- Capacity building for EU standard implementation and information campaigns within the forest based sector.

In terms of the axis for the development of the rural economy, the first aspect targets improvement and development of rural infrastructure. Rural infrastructure is key for any improvement of production, logistics, and marketing in the forest-based sector in BiH. This entails both public infrastructure and infrastructure in enterprises. The recommendations comprise:

- Development of a concept for optimal forest road and harvesting refinement;
- Foster the establishment of vertical and horizontal logistics chains and respective infrastructure in the forest-based sector;
- Support modern communication technologies and web-access infrastructure in rural areas;
- Support exploration of private financing mechanisms and investment opportunities, investment in tourism infrastructure in rural areas.

For the development and diversification of rural economic activities, it is important to highlight that future accession to the European Union might imply stronger competition and compliance pressure to EU standards. IPARD represents a proper instrument for fostering product diversification, niche detection, and brand creation to render rural economies compatible on the national and international market. It is recommended to:

- Support the establishment of regional horizontal and vertical marketing platforms of wood products and NWFP;

- Provide financial and structural support to maintain and create small and medium-sized enterprises in the forest and wood processing sector including Amendments of tax systems and programmes for start-up financing (including Grants, micro-credits);
- Carry out a feasibility study for investment opportunities in integrated heating systems, local and a distant heating systems in municipalities;
- Support marketing and brand creation of end-manufactured wood products and in the production and marketing chain of NWFP.

Furthermore, training is a major component of capacity building measures that are required in the forest-based sector in BiH to modernize operation and support compliance with EU and its *acquis*.
This includes trainings at all levels from continuous education, training in cross-sectoral issues of rural development such as eco-tourism and land management, until a revision of education engineers and forest land managers/administrators. Recommendations in this aspect include:

- Awareness rising, training and capacity building with private forest owners for sustainable forest management;
- Import of international know-how in wood-based industries, and establishment of new trainee programmes in wood-based industries;
- Capacity building programmes for EU standard implementation and information campaigns within the forest based sector;
- Support for curricula revision and connection to international education programmes;
- Establishment of a multi-level training programme for forest ecosystem management and rural development to re-educate workforces;
- Establishment of cooperation mechanisms between education institutions and enterprises.

Finally, technical assistance in terms of technical support in order to improve know-how, technology, and logistics has led to the following recommendations:

- Technical assistance for revision of the forest administration and public forest enterprises;
- Technical assistance for new forest road construction and improving harvesting technology.

With regards to the new forestry measure of IPARD 2014-2020 programme of the European Commission focus points on afforestation and agroforestry, fire prevention and restoration after fire, and improving the resilience and environmental value of forest ecosystems are highlighted.
All these focus point have a rather ecological approach, and are applicable to parts of the identified priorities for action. While afforestation is of only limited gravity in a richly forested country like BiH, and agro-forestry did not feature high on the agenda; e.g. in the SWOT workshops, the measure of fire prevention and restoration is a highly required means to implement some of the key proposal of this study. Measures for improving the resilience and environmental value find their counterpart in the recommendations; e.g. for Natura 2000 pilot cases.
Based on these recommendations operational needs for investments are specified in the report as potential and promising fields for investment to foster rural development in the context of the forest-based sector in BiH.

2. Background and context for the sector analyses in BiH

This introductory chapter provides general information about Bosnia and Herzegovina (BiH). It also describes the context of the sector analyses regarding preparation for EU accession, the objectives of the sector reports and the methodology used in the preparation of the Fishery and Forestry sector analysis. Finally, the section presents central key figures related to the BiH economy and to the agricultural sector specifically.

2.1 General information about BiH

Bosnia and Herzegovina is located in the western part of the Balkan Peninsula and covers an area of 51 129 km^2. In 1990, Bosnia and Herzegovina held its first democratic multiparty elections and in early 1992 it became an independent country (BiH Statistical Agency, 2013).

BiH has borders with Serbia to the East, Montenegro to the South East, Croatia to the North and West, and a 12 kilometre coastline on the Adriatic Sea. Its landscape varies from high altitude central mountains to arable land in the north and Mediterranean vineyards in the south, with most of the major towns being located in valleys. Climatically, Bosnian summers last from May to September and are warm and humid, whilst winters tend to be foggy and snowy and last from November to February. Autumn and spring are usually short.

Bosnia and Herzegovina consists of two entities and the Brčko District (BH). The Federation of Bosnia and Herzegovina (BiH) covers 50 percent of the territory and Republika Srpska (RS) about 49 percent of the territory. Brčko District covers the remaining one percent of the total territory (Agency for Statistics of Bosnia and Herzegovina, 2014).

The current administrative divisions (Figure 2.2) are based on the lines drawn up as part of Dayton Peace Agreement in 1995. The Federation of Bosnia and Herzegovina, Republika Srpska and Brčko District all have their own constitutions. According to the preliminary results of the Census in Bosnia and Herzegovina the total population is 3 791 622, out of which 2 371 603 live in FBiH, 1 326 991 in the Republika Srpska and 93 028 in Brčko District (Agency for Statistics of Bosnia and Herzegovina, 2014).

The Federation of Bosnia and Herzegovina is decentralized. It consists of 10 Cantons (each with its own government) and 79 municipalities. The Government of the Federation of Bosnia and Herzegovina shares and delegates some of its competencies with the Cantonal administrations. Both the Government and the Cantons have the right to determine policy and to adopt laws that pertain to any of their competencies. Where competencies are further delegated to the municipalities (the lowest administrative level), their activities are financed and supervised by the Cantons (Agency for Statistics of Bosnia and Herzegovina, 2014).

Fact box 1: Key features of Bosnia and Herzegovina

• Total Area: 51 000 km^2 of which 12.2 km^2 are water bodies • Arable land: 19.84 percent • Permanent crops: 1.92 percent	• Population: 3 831 555 million • Capital: Sarajevo • Major languages: Bosnian, Croatian and Serbian • Life expectancy: 72 years (men), 78 years (women) (UN)

Source: BiH Statistical Agency, 2013 and UNDP, 2013

Fig. 2.1: Map of BiH larger cities

Source: FAO, 2012

Fact box 2: GDP and related data

• GDP: EUR 13.485 billion (2013) • Agricultural GDP: 18.5 percent (2013) • GDP per capita: EUR 3 518 (2013)	• Main export products: Wood and paper, metal products • Main agricultural products. Fresh cows' milk and dairy products

Source: Agency for Statistics of Bosnia and Herzegovina, 2014

Republika Srpska is centralized and has no Cantons. It shares and delegates some of its competencies directly with 58 municipalities and six cities. The Brčko District (comprising the entire territory of the former Brčko municipality) is a self-governing administration under the direct jurisdiction of Bosnia and Herzegovina (Agency for Statistics of Bosnia and Herzegovina, 2014).

2.2 Context and objective of the sector analyses

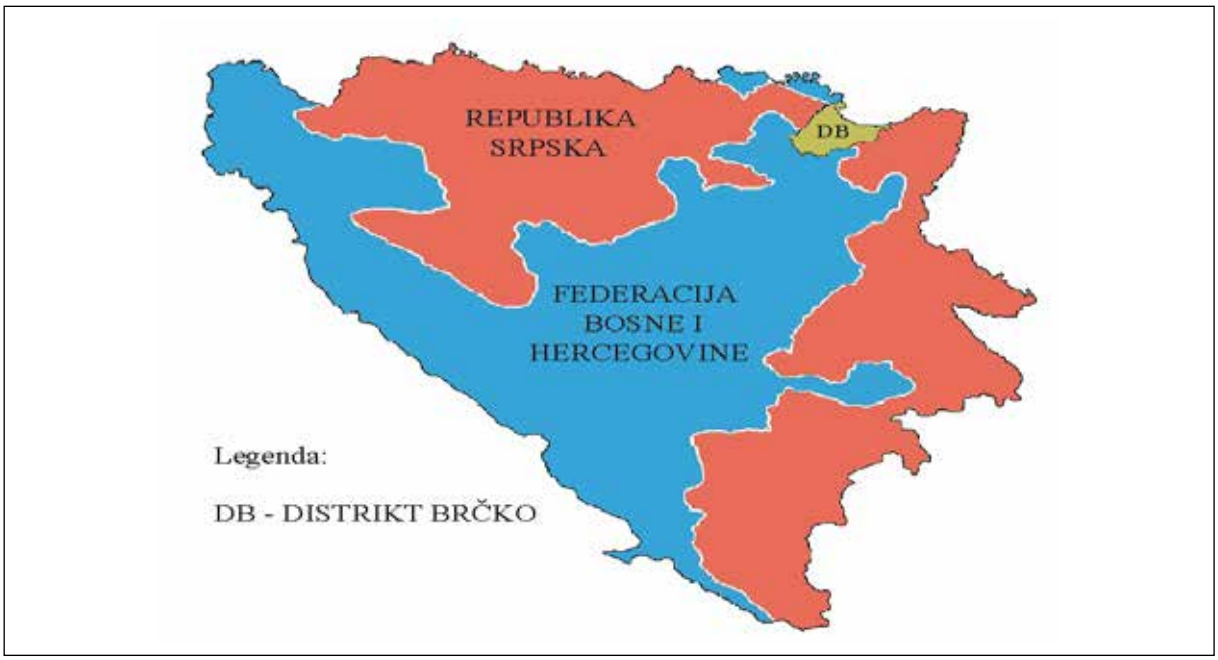
2.2.1 General Context of the sector analyses: Preparation for EU accession

Bosnia and Herzegovina is a potential candidate country for EU accession following the Thessaloniki European Council of June 2003. In June 2008 the EU and Bosnia and Herzegovina signed the SAA. An Interim Agreement on Trade and Trade-related issues entered into force on 1 July 2008 and the Council adopted a new European partnership with Bosnia and Herzegovina on 18 February 2008.

Bosnia and Herzegovina has benefited from EU autonomous trade measures since 2000. After the Interim Agreement came into force on 1 July 2008, EU access to products from Bosnia and Herzegovina has expanded, and EU exports to the country have been granted trade preferences.

Bosnia and Herzegovina and the EC signed the Financing Agreement for the IPA 2007 National Programme on 31 July 2008,

Fig. 2.2: Administrative division of Bosnia and Herzegovina



Source: Agency for Statistics of Bosnia and Herzegovina, 2014

which was a major milestone on Bosnia and Herzegovina's road to Europe. The total financial allocations within the IPA 2007–2013 are ca Euro 655.5 million[5].

As a pre-candidate country, Bosnia and Herzegovina cannot yet take full advantage of IPA support. Preparations are being made and should be accomplished by the time Bosnia and Herzegovina becomes an EU candidate country, and when the implementation of the IPARD supports for agricultural and rural development is initiated. So far, there are no specific projects toward IPARD, due to pending country's progress in ensuring key sector priorities in place, namely a country wide sector strategy and IPARD set up.

2.2.2 Objectives of the forest sector report

The main objective of the report is to provide a comprehensive analysis of the forest sector in Bosnia and Herzegovina. The report contributes to the analysis of the internal strengths and weaknesses as well as of the external opportunities and threats to the sector. In light of the needs and problems of the sector and the challenges ahead, investment needs are estimated and policy recommendations are formulated. In this way, the report contributes to the formulation of a number of possible policy interventions for the agriculture and rural development policy in line with the needs for the development of the sector. The study presents:

- Background and key figures of the sector;
- Structural characteristics of the sector;
- Market and trade;
- Government policy for the sector at state and entity levels;
- Level of attainment of relevant EU standards;
- Development in terms of investment;
- Identification of potential and needs in the sector and provision for related recommendations.

5 http://europa.ba/Default.aspx?id=15&lang=EN

The outcome of the sector review includes a transparent overview of the sector, an analysis of the potential and obstacles to realize this potential, as well as IPARD type measures and recommendations in order to target investments.

The forest sector analyses to be carried out in Bosnia and Herzegovina were selected based on the EU standard relevance as well as economic relevance. The importance was highlighted at the final stakeholder workshop in May 2012 of project titled *Preparation of IPARD Sector Analyses in Bosnia and Herzegovina*, funded by the European Union *and implemented by FAO.*

2.3 Methodology of the forest sector report

The main purpose of the sector analyses is to identify which segment/area/beneficiary should be targeted in detail within each sector through the future IPARD programme in Bosnia and Herzegovina. The study has the following steps:

- Development of work plan and methodology
- Structural description of the sector
- Regional variation and disparities
- Investment requirements and capacities
- Market potential
- National policies and regulation
- SWOT analysis and benchmarking

Focusing on the following aspects:

- Forest resources and management
- Land use and land use change
- Forest-based sector including industries & Forest-based products, services and value chains
- Forest Policy and Governance

Table 2.1: Gross Domestic Product (GDP) of Bosnia and Herzegovina, 2007–2013, Million Bosnia and Herzegovina Convertible Mark (BAM) and Million EUR

Item	2007	2008	2009	2010	2011	2012	2013
GDP Bosnia and Herzegovina, Million BAM	21 778	24 718	24 004	24 484	25 211	24 735	26 297
GDP Bosnia and Herzegovina, Million EUR	1 111	12 611	12 247	12 678	12 929	12 684	13 485
GDP Bosnia and Herzegovina per capita, BAM	5 668	6 433	6 246	6 371	6 533	6 246	6 862
Population, Bosnia and Herzegovina, Million	3 842	3 842	3 843	3 843	3 842	3 843	3 835

Source: Agency for Statistics Bosnia and Herzegovina www.bhas.ba , own calculations, exchange rate BAM to EUR = 1.96 all years.

Table 2.2: Yearly growth rates in GDP, GDP per capita EUR, various countries, 2013

Country	Croatia	Bosnia and Herzegovina	Albania	TFYR Macedonia	Montenegro	Serbia
GDP growth from previous year, %	5	7	6	4	7	8
GDP per capita, EUR	8 443	2 879	2 088	2 488	3 438	3 447

Source: EUROSTAT http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

- Level of attainment of relevant EU standards
- Education and Qualification

2.4 General economic indicators for Bosnia and Herzegovina

This section of the report provides basic economic information on the development of the Bosnia and Herzegovina economy to be used as reference data in the specific sector analysis. Generally speaking the Bosnia and Herzegovina economy is characterized by a good level of recovery. Over the last eight years, Bosnia and Herzegovina has registered economic growth except for 2009.

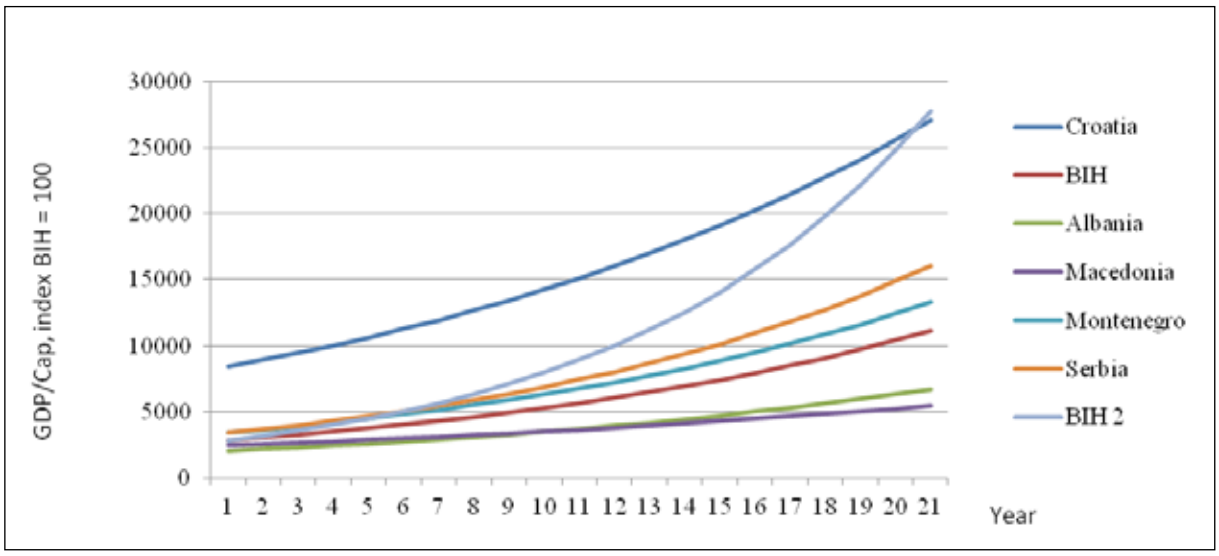
2.4.1 Demography[6]

The total population of Bosnia and Herzegovina is not known precisely. The census that was performed in 1991 indicated a total population of 4 377 033. At that time, 60 percent of the population was living in rural areas. The war, and the economic difficulties that resulted from it, caused important migration flows both internally and towards Western Europe and other countries in the region. Official statistics and estimations of different organizations show very different figures for the demography of Bosnia and Herzegovina. The official Statistical Office of Bosnia and Herzegovina shows a total population of 3 831 555 (2013). The last census was carried out in October 2013 and the results are expected to be published in near future, which will ensure an important update in the above parameters for the current country's demographic outline.

2.4.2 General economic indicators

The development in Gross Domestic Product (GDP) from 2007 to 2013 is presented in the table below. The economy demonstrated a very positive performance from 2011 to 2013 with an average yearly growth of 13 percent (in current prices), when the international financial crises changed the scene dramatically. 2009 was a year of decline, while 2011 brought the economy back on a positive track, and indeed saw an improvement compared to 2008[7].

Fig. 2.3: GDP per capita, 20-year extrapolation of growth rates from 2012, various countries



Source: EUROSTAT http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/

6 Agency for Statistics Bosnia and Herzegovina www.bhas.ba

Compared with other countries in the region (Croatia and TFYRM), Bosnia and Herzegovina is performing relatively well. The same is true when comparing to EU-27 GDP development (see the table 2.2).

If the growth rates from 2013 are prolonged, development will follow the curve shown in the graph below.

An extrapolation of the 2012 level of GDP per capita in Bosnia and Herzegovina with seven percent, which was the growth rate from 2010 to 2012, illustrated with the line Bosnia and Herzegovina 1 in the graph 2.2, will only keep Albania and The Former Yugoslav Republic of Macedonia behind in the growth race within the next 20 years. To catch up with Croatia – which has an annual average GDP per capita growth rate of 5 percent – in 20 years, Bosnia and Herzegovina would need to see 12 percent growth. In other words, catching up with the countries in the region is a major political challenge.

The contribution from the entities to the Bosnia and Herzegovina state level GDP is quite stable over the period, even though an increase in the share of Republika Srpska was observed between 2008 and 2011; namely, from 32 percent in to 34.2 percent, representing a total increase of 7.2 percent. The Federation of Bosnia and Herzegovina and Brčko District both experienced a decrease in their contributions to the overall economy from 2008 to 2011, with a modest decrease of 2.2 percent for Bosnia and Herzegovina and a more substantial 24 percent decrease for Brčko District (EUROSTAT, 2014)[8].

Employment[9]

According to data collected during the fourth Labour Force Survey (LFS) in Bosnia and Herzegovina, carried out by the Agency for Statistics of Bosnia and Herzegovina in May 2012 (over 10 509 households considered) it seems that the labour force numbered 1 131 557 persons for 1 462 619 inactive persons.

Among the labour force there were 859 218 persons in employment and 272 339 unemployed persons. Among persons in employment there were 58 039 unpaid family workers. According to data collected in 2012, the unemployment rate was 24.1 percent (23.1 percent for men and 25.6 percent for women), while in the same period in 2010 it was 23.4 percent (21.4 percent for men and 26.8 percent for women). The unemployment rate was highest among young persons aged 15 to 24 years. It was 47.5 percent (44.8 percent for men and 52.3 percent for women).

In 2010 and 2012, the activity and employment rates revealed by the LFS were 44 percent and 33.5 percent respectively. The activity and the employment rates were by far the highest in the age group 25 to 49 years (69.1 percent and 53.5 percent).

The structure of persons in employment by employment status shows persons in paid employment account for by far the greatest share (72.8 percent). The share of self-employed persons was 20.5 percent (only 27.4 percent of them were women). The share of unpaid family workers was 6.8 percent (68.9 percent of them were women).

The structure of persons in employment by sectors of activity shows that 47.3 percent of them worked in services, 31.5 percent in industry and 21.2 percent in agriculture.

7 Agency for Statistics Bosnia and Herzegovina www.bhas.ba

8 Eurostat

9 Agency for Statistics Bosnia and Herzegovina www.bhas.ba, Agency for Work and Employment of BiH

2.4.3. Agricultural indicators

A key constraint for improvement of agricultural sector management in Bosnia and Herzegovina is the lack of accurate, reliable and up-to-date information. Despite substantial EU and international donor assistance with initiatives such as a pilot Farm Accountancy Data Network (FADN) and a Pilot Agricultural Census, current information collection, collation and dissemination is still often undertaken in a rather unplanned manner. Existing published sector information is relatively limited and the information made available is often considered to be of a relatively poor quality, lacking statistical rigour or relevance to the emerging market economy. With those caveats made, below is a summary of the situation in Bosnia and Herzegovina agriculture based on available statistics.

Agricultural land in Bosnia and Herzegovina[10]

Bosnia and Herzegovina has a total area of 51 209.2 km^2, of which the sea surface is 12.2 km^2, which means that land surface is 51 197 km^2.[11]

Regarding land use there are different data sources presenting different data. According to MOFTER (2007), of the total land area, plain land covers five percent, hills cover 24 percent, mountains cover 42 percent and karsts cover 29 percent. Forests and woodlands cover about 50 percent of Bosnia and Herzegovina territory, and agricultural land covers 2.5 million hectares or 0.7 ha per capita.[12]

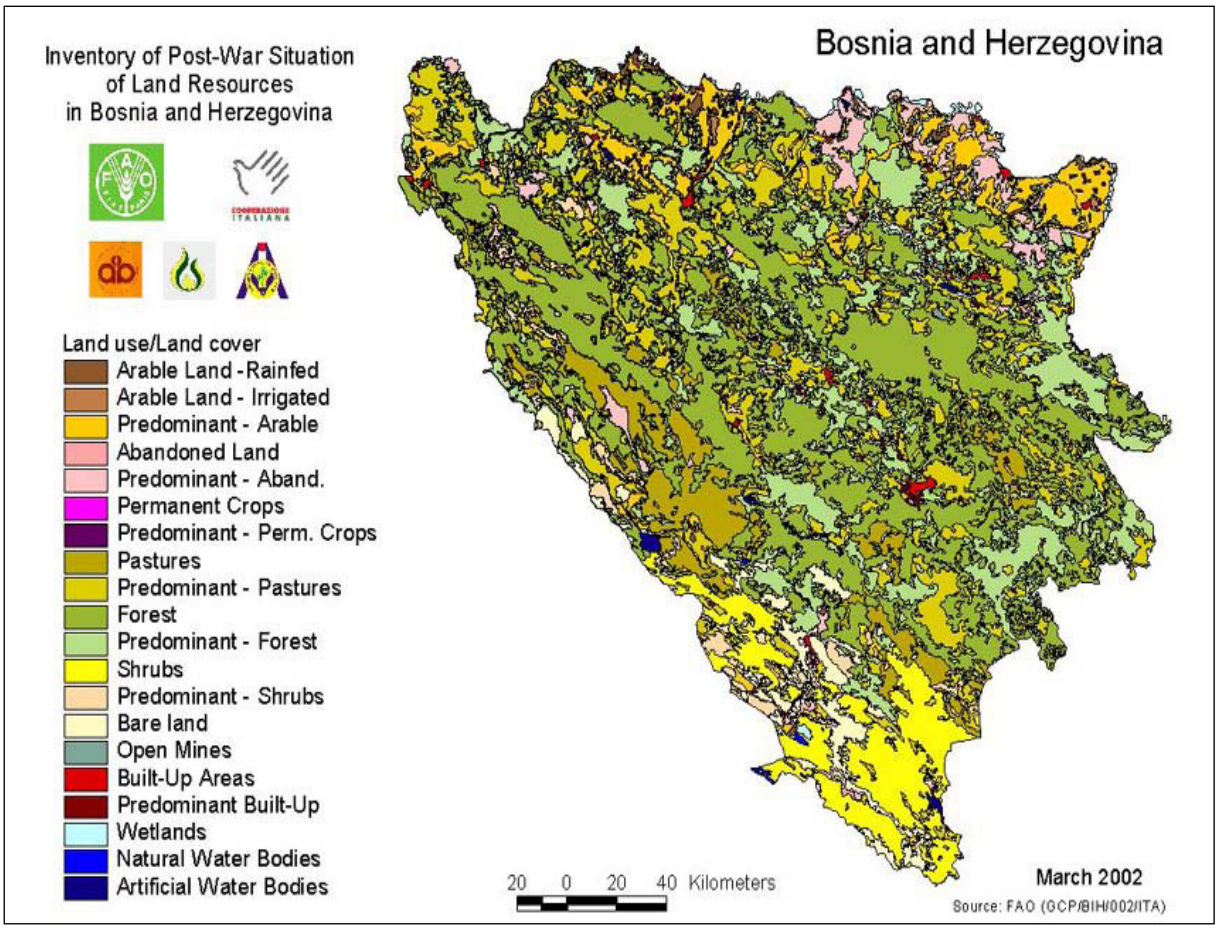
Land cover in Bosnia and Herzegovina is heterogeneous. About 86 percent of soils are automorphic, and the remaining 14 percent are hydromorphic soils. A large part of Bosnia is exposed to water erosion, particularly its central and southern part.

As with other data for Bosnia and Herzegovina, data on agricultural land is not always in line. Depending on the source, this figure varies and differs considerably. According to the report for the agricultural sector in Bosnia and Herzegovina for 2012[13], Agricultural land in BiH covers 2 572 000 ha, which is 50.3 percent of the total land surface in BiH. Of this total, arable land covers 1 585 000 ha, which accounts for 62 percent of agriculture land. Around one million ha of arable land is used, and 47 percent is unused.

Similar information can be found in other sources. For example, Jaksic[14] states that Bosnia and Herzegovina has 2.52 million ha of agricultural land, of which 1.02 million hectares is arable land. According to the same source, 51.3 percent of agricultural land (1.294 million ha) belongs to FBiH, and 48.7 percent (1.23 million ha) to RS. Out of the 1.02 million ha of arable land, 44 percent belongs to the FBiH and 56 percent to RS.
The dominant agro-ecology use of certain parts of the territory of Bosnia and Herzegovina is shown in the map below. This is the outcome of research within the framework of the FAO project “Inventory of the postwar situation of land resources in Bosnia and Herzegovina”.

10 Agency for Statistics Bosnia and Herzegovina www.bhas.ba
11 A report of the Agricultural Sector in Bosnia and Herzegovina 2007, Ministry of Foreign Trade and Economic Relations, 2008, p. 6.
12 Action Plan for Environmental Protection Bosnia and Herzegovina (National Environmental Action Plan of Bosnia and Herzegovina), Ministry of nment, 2003, p. 10.
13 Ministarstvo Vanjske Trgovine I Ekonomskih Odnosa Bosne I Hercegovine (2013): Izvještaj Iz Oblasti Poljoprivrede Za Bosnu I Hercegovinu Za 2012.Godinu - Godišnji izvještaj o stanju u sektoru poljoprivrede, ishrane i ruralnog razvoja, p. 12.
14 Jakšić Duško, Postdejtonska stvarnost i perspektiva, Atlantik, Banja Luka, 1997, p. 95.

Fig. 2.4: Post-war situation of land resources in Bosnia and Herzegovina[15]



15 FAO/Italy Government Cooperative Programme project GCP/BIH/002/ITA

3. Forest resources and management in BiH

3.1 Statistical data sources

Statistical data sources on forest resources comprise of two central elements:

- Statistical Information based on the data from public Forest Enterprises and Agencies for Statistics
- National Forest Inventory (NFI)

As regards forest statistics, information on forest resources has been mainly been based on taxation of forest stands under public Forest Enterprises responsibility as a means for management planning. This data does not provide a comprehensive overview on forest resources such as forest area and growing stock.

For BiH the last official NFI data was on the 1964–1968 period (data taken from GFRA, FAO, 2005). Interestingly, this data has been used for national and international report on forest resources up to now, which places severe question marks on the reliability of forest information as a basis for planning and policy making. The 2nd NFI was conducted 2006–2009, but still lacks proper publication up to this very day. However, some first synthesised results were leaked from a FIRMA study (USAID, 2012), the data from which will be used in this sector study as a verification on forest resources.

3.2 Forest area and other wooded land

Forest area is a key indicator for sustainable forest management worldwide, and a principal parameter for assessing the maintenance of forest land. It is designed to depict positive and

Table 3.1: Overview on data sources for forest resources in BiH

Institution	Source	Period	Available at:
Agency for Statistics of BiH	Reports on production, sales and stocks of forest assortments in BiH (quarterly and yearly published) **no report for 2006*	2004–2013	http://goo.gl/vcAsjn http://goo.gl/FX06I2
Institute for Statistics RS	Annual Forest Bulletin	2005–2013	http://goo.gl/Qq5TQY
	Monthly releases on: Production, sale and stocks of forest assortments in public forests	Oct 2013– Sept 2012	http://goo.gl/f5ZLQe
	Statistical Yearbooks (Chapter on Forestry)	2009–2013	http://goo.gl/tRskF1
Institute for Statistics of F BiH	Monthly statistical review – Chapter on Agriculture, hunting and forestry	2008–2013	http://goo.gl/DUXzBo
	Statistical Yearbooks (Chapter on Agriculture, hunting and forestry)	2006–2012	http://goo.gl/wZFuHg
	Monthly release– Production and sale of forestry assortments in FBiH	2013	http://goo.gl/BEB786
Ministry for Agriculture, Water Management and Forestry of F BiH	Annual information on forest management in the FBiH	2006–2011	http://goo.gl/jK4Zf8
FAO	Global forest resources assessment country report BiH	2010	http://goo.gl/HFFVdq

Table 3.2. Structure of forest area and forest land by vegetation form, purpose of use and availability in BiH (USAID 2012)

Vegetation form	Available surface				Protective forest	Total
	Economic forests	Non-economic forests	Protected forests	Special purpose forests		
	ha	ha	ha	ha	ha	Ha
1. High forest	1 329 500	46 300	5 200	8 800	262 600	1 652 400
2. Coppice forest	843 200	158 700	1 600	2 400	246 300	1 252 200
1+2. All forests	2 172 700	205 000	6 800	11 200	508 900	2 904 600
3. Shrubbery	52 700	41 100	0	100	36 700	130 600
4. Barren land	55 700	88 400	800	3 400	38 900	187 200
3+4. Shrubbery and barren	108 400	129 500	800	3 500	75 600	317 800
5. Other forest areas	3 300	3 100		100	2 600	9 100
FAO forest (1+2+3+5)	2 228 700	241 600	6 800	11 400	548 200	3 035 700
6. All forest and forest land	2 284 400	337 600	7 600	14 800	587 100	3 231 500

negative changes, detect deforestation, and review regional patterns of change.

The latest data of the 2nd NFI is presented in table 3.2 Economic forests are defined as those forests which are actually managed for economic purposes. Non-economic forests are forests out of active management. Protected forests are forest that serve primarily for the protection of land, waters, settlements, economic or against natural disasters, and forests established as protection belts and forests on upper boundaries of vegetation. Special purpose forests are those forests that are especially rare in nature or have a special cultural, religious, or historic importance; including national parks, natural parks, nature preserves, forests intended for leisure activities, sports, recreation, teaching, and scientific research, climatic and other health resorts, hunting grounds, as well as forests of special interest for national defence, seed growing and seed facilities, and sources of potable water. Inaccessible are is mainly related to minefields.

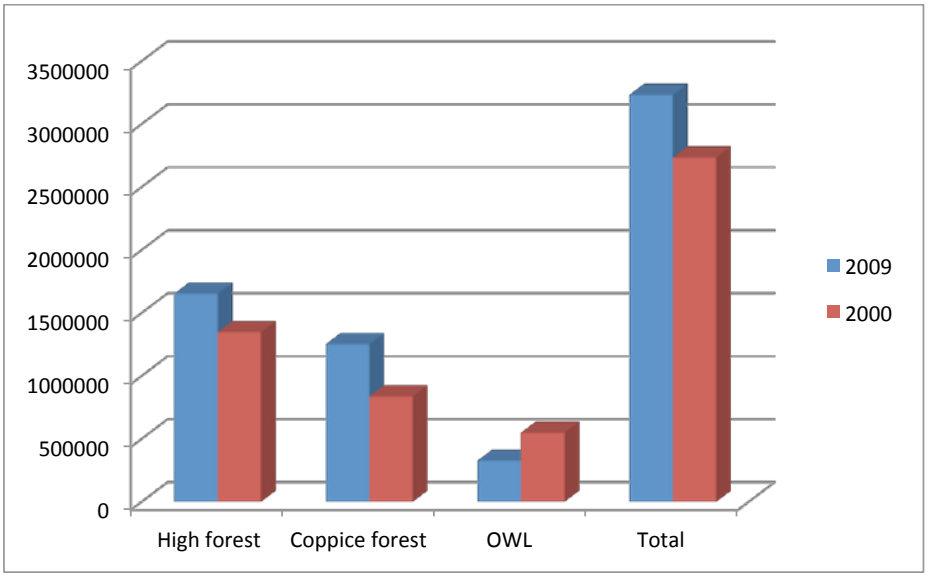
These figures show a total of 3 231 500 ha of forest and other wood land, out of which 1 652 400 ha are high forests and 1 252 200 ha are coppice forests. The rest is characterised as other wooded land and comprises shrubs, barren forest land, and other forest areas. In total, these new figures imply that about 63 percent of total territory of BiH are covered with forest and other wooded land, one of the highest values in Europe.

As compared to the 1st NFI going back to the 1960s (reporting a total area of forest and other wooded land at a magnitude of 2.734 million ha), this means a significant increase of forest area in all categories and an underestimation of currently reported figures (e.g. for FAO Global Forest Resource Assessment and Forest Europe by more than 15 percent (Fig 3.1).

It has to be mentioned that there are a number of reasons for this increase in forest area. The two major reasons being:

- Change in inventory methodology from a taxation to a statistical approach, which makes the two data sets principally incomparable

Fig 3.1: Comparison of 1st (as reported lately in 2000) and 2nd NFI (2009) for BiH in terms of forest area (ha) (own calculation based on NFI 1964–1968 and USAID, 2012)



- Factual increase of forest area due to afforestation (minor) and natural reforestation in mainly abandoned land (major)

3.3 Structures: high forests and coppice forests

Forest resources in BiH show typical structures for countries in South-East Europe, for which a huge amount of coppice forests are typical. From the latest NFI we know that coppice forests amount to 1.252 million ha in total and to 843 000 ha in productive (economic) forests, i.e. almost 40 percent of productive forests. While RS and FBiH share almost the same amount of high forest, the coppice is significantly larger in RS.

As regards the ownership share of the two major structural forest forms, we can also observe some typical patterns. The ratios of high forests and coppice forests are diametrically opposed when comparing public and private ownership. While the state owns 72 percent of high forests, private forest owners are predominantly found in relation with coppice forest (434 000 ha or 62 percent of total economic coppice forests) (table 3.4).

These figures give a clear indication about the distribution of forest resources in BiH. Public forests comprise most of the high forests, which are more profitable and under systematic forest management. The state manages the better forest sites in the country

Table 3.3: High forests and coppice forests available for economic production in RS and FBiH

Silviculture form of forest	Available economic productive forests	
	in RS ha	in FBiH ha
1. High forest	647 300	673 300
2. Coppice forest	485 300	355 400
Total	1 132 600	1 028 700

Table 3.4: Ownership of economic high and coppice forests in BiH (USAID, 2012)

Economic forests	Area				Total in BiH
	State owned		Private owned		
	ha	percent	Ha	percent	ha
High forest	1 063 400	72	266 100	38	1 329 500
Coppice forest	408 700	28	434 500	62	843 200
All forests	1 472 100	100	700 600	100	2 172 700

and uses the opportunity for afforestation and conversion of coppice forests to high forests. Private forest owners' high share of coppice forests illustrates the needs of forest owners to sustain their livelihoods as a primary source for firewood and small construction wood; e.g. for fencing poles. These owners have insufficient means (financial, institutional and capacity) to further develop their forest properties towards more economically viable forms of forest management.

3.4 Wood resources and carbon stocks in forests

Wood and timber are the primary products of forest management in BiH. Like the underestimation of forest area using old inventory data, this also holds true for quantities of growing stock and carbon stock. New NFI data speak of a growing stock of 435 million m³ in BiH, amounting to 201 m³ per ha (table 3.5). In total, this means that growing stock is expected to be 23 percent higher than officially reported, e.g. in Global Forest Resource Assessment GFRA, 2010.

The first calculations following the procedures of the FAO Global Forest Resource Assessment for the BiH country report 2010 confirm that biomass and carbon stock are higher than suggested in officially reported data; that is, 23 percent for biomass and 16 percent for carbon stock as compared to internationally reported data.

This calculation is based on the data for productive forests as presented in the FIRMA study (USAID, 2012). For a verified carbon accounting a more validated calculation method has to be applied.

3.5 Forest types and generic management regimes

Forests in BiH comprise a huge diversity of forest types, ranging from coastal Mediterranean forest to mountain forests in central BiH. Fig. 3.2 shows the distribution

Table 3.5. Growing stock of accessible high and coppice economic forests per ownership in BiH (USAID 2012)

Economic forests	Growing stock - wood volume				
	Public owned		Private owned		Total in BiH
	in 1000 m³	m³ per ha	in 1000 m³	m³ per ha	m³ per ha
High forest	299 630	282	53 968	202	266
Coppice forest	35 710	87	46 412	107	97
All forests	335 340	228	100 380	143	201

Table 3.6: Calculations on biomass and carbon in BiH forest based on data from 2nd NFI

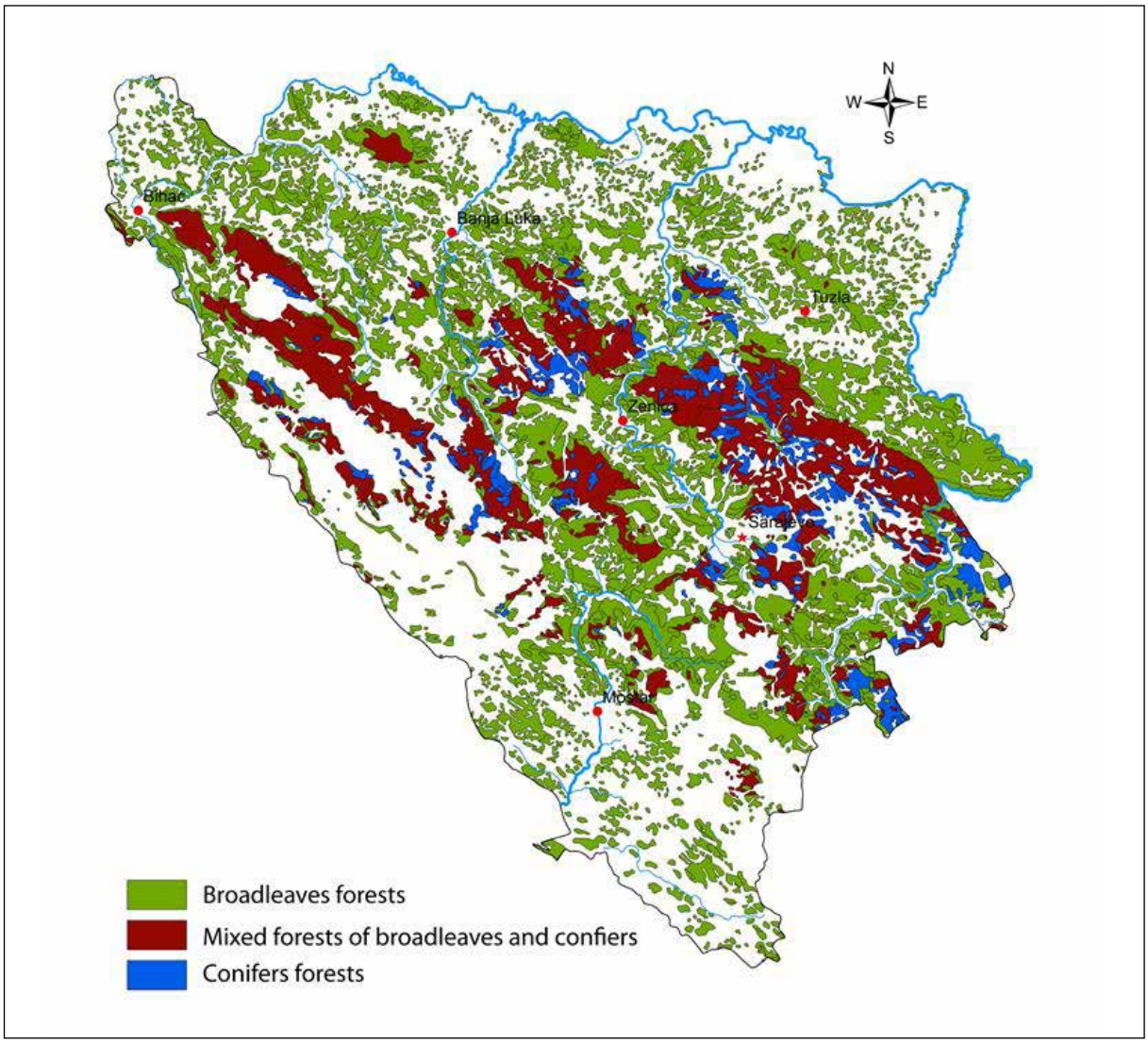
	Biomass	Carbon
	Million tonnes	Million tonnes
Above-ground	306.13	143.88
Below-ground	91.84	43.16
Total 2009	397.97	187.05

of forests in BiH, and the spatial patterns of coniferous forest in the highlands, mixed forests in the mid altitudes, and broadleaved forest in the low-level terrains and floodplains.

forest types embracing categories of the European Environmental Agency (EEA, 2006):

- Category 4 - Acidophilous oak forests
- Category 5 - Mesophytic deciduous forest

Fig. 3.2: Forest distribution in BiH (new representation after Stefanovic and Beus, 1983)



More specifically, there is a wealth of forests in BiH. Fig 3.3 shows that forest types in BiH include a broad variety of major European

- Category 6 - Beech forest
- Category 7 - Mountainous beech forest
- Category 8 - Thermophilous deciduous

forest

- Category 9 - Broadleaved evergreen forest
- Category 10 - Coniferous forests of the Mediterranean, Anatolian and Macaronesian regions
- Category 11 - Mire and swamp forest
- Category 12 - Floodplain forest

The prevailing 9 out of 13 major European forest types illustrates the rich diversity of forests in BiH and the potential role forests can play in biodiversity and habitat protection, as well as a diversified portfolio of tree species and forest ecosystems in term of producing forest goods.

Fig 3.3: Forest vegetation maps of BiH (Stefanovic and Beus, 1983)

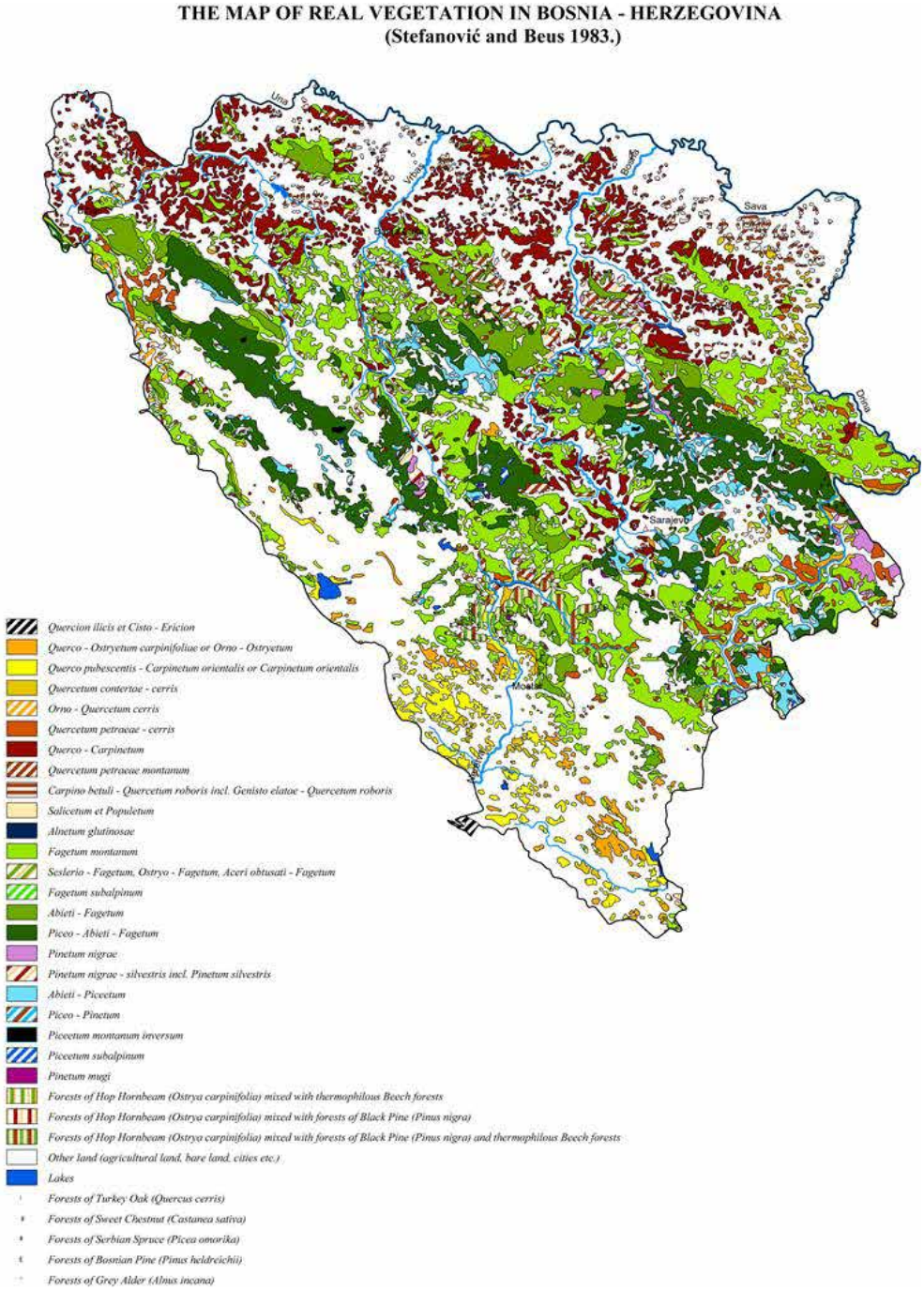


Table 3.7: The area of mayor forest types in BiH according to Stefanović and Beus (1983)

No	Regional forest association	Latin name of the association	Area (percent)
1	Degradation stages of Holly oak	(Sv. Quercion ilicis et Cisto - Ericion)	0.1
2	Thermophilic oak forests	(Querco - Ostryetum carpinifoliae) ili (Orno - Ostryetum)	2.1
3		(Querco pubescentis - Carpinetum orientalis) ili (Carpinetum orientalis)	3.5
4		(Quercetum contertae - cerris)	1.5
5		(Orno - Quercetum cerris)	0.6
6		(Quercetum petraeae - cerris)	2.8
7	Mesophilic oak forests	(Querco - Carpinetum)	15.2
8		(Quercetum petraeae montanum)	4.0
9		(Carpino betuli - Quercetum roboris including Genisto elatae - Quercetum roboris)	2.2
10	Hygrophilous forests	(Salicetum et Populetum)	0.0
11		(Alnetum glutinosae)	0.0
12	Beech and Beech and Fir forests	(Fagetum montanum)	29.5
13		(Seslerio - Fagetum, Ostryo - Fagetum, Aceri obtusati - Fagetum)	0.7
14		(Fagetum subalpinum)	1.3
15		(Abieti - Fagetum)	7.9
16		(Piceo - Abieti - Fagetum)	18.6
17	Forests of Scots and Black pines	(Pinetum nigrae)	0.9
18		(Pinetum nigrae - silvestris including Pinetum silvestris)	1.9
19	Spruce forests	(Abieti - Piceetum)	3.2
20		(Piceo - Pinetum)	1.0
21		(Piceetum montanum inversum)	0.1
22		(Piceetum subalpinum)	0.3
23	Mountain pine forests	(Pinetum mugi)	0.1
24	Vegetation complexes	Forests of Hop Hornbeam (Ostrya carpinifolia) mixed with thermophilous Beech forests	0.2
25		Forests of Hop Hornbeam (Ostrya carpinifolia) mixed with forests of Black Pine (Pinus nigra)	0.1
26		Forests of Hop Hornbeam (Ostrya carpinifolia) mixed with forests of Black Pine (Pinus nigra) and thermophilous Beech forests	2.3
		Total	**100.0**

Table 3.8 Ownership types by forest categories (Glück et.al., 2010)

Forest category	Public forests		Private forests	
	ha	percent	Ha	percent
High forests	1 184 848	92	107 076	8
Beech	353 353	91	36 916	9
Fir, spruce and beech	566 480	97	19 336	3
Scots and Austrian pine	90 118	96	4 009	4
Sessile oak	79 738	75	26 675	25
Other high forests	95 159	83	20 140	17
Coppice	621 647	68	296 161	32
Beech	145 435	62	90 153	38
Sessile oak	84 835	52	78 312	48
Mixture coppice	263 872	73	95 385	27
Other coppice	127 505	80	32 311	20

Table 3.8 (Glück et al., 2010) shows the main forest categories in BiH according to different ownership classes. It has to be noted that this data still relies on the old NFI in the absence of newly published data.

The management planning process and management regimes applied in major forest types in BiH are directed toward multi-aged silvicultural systems. The application of close to nature forest management represents a basic principle in forest management practice. Depending on the forest structure and condition the following management regimes are usually applied:

1. Single-tree selection
   This forest management regime is mainly applied in mixed forest of beech and silver fir that are located on inferior habitats and extreme orographical conditions. In these kind of conditions the coverage by tree crowns must not be significantly reduced for protective reasons, while the natural tree regeneration should be preferred. This management regime is suitable especially for those areas that have a protective purpose and in the forests which are dominantly constructed by “shadow” tree species (e.g. beech, fir, spruce).
2. Group selection
   With the application of this management regime the uneven-aged mixed forests are formed. In most of the cases natural regeneration of stands dominates and it is not time limited (indefinite regeneration period). Artificial regeneration is implemented in part of the stands where natural regeneration is difficult or if the introduction of selected tree species is prescribed by management plan. This management regime is most suitable for application in mixed forests of beech, silver fir and spruce, as well as in the forests that are currently in the phase of natural succession toward the mixed forests of beech and silver fir (with spruce), mixed forests of silver fir and spruce, mixed forests of silver fir and beech, and in the forests of silver fir and spruce with no admixture. Generally speaking, this management regime is applied in those forest types where the management goal is to construct uneven-aged forests with natural regeneration.

3. The management regime of group felling
   Under this management regime the stands that are in transition between uneven-aged and even-aged forests are formed in terms of their diameter and height structure. The regeneration is time limited and can be described as combination of natural (in those areas of stands which have better conditions) and artificial (for unfavourable parts of the stand). The overall regeneration period is quite long and lasts between 30 and 60 years. This management regime can be applied in high forests of oak, all pine forests, mixed forests of oak and pines as well as beech forests with no admixture where the single-tree selection was applied in recent time.

3.6 Forest health and damages

As regards the health situation in forests in BiH, Fig. 3.4 clearly demonstrated that human-induced pressures are the main damaging factors for forests. The two predominant causes are:

- Forest fires
- Human made damages such as illegal logging, devastation etc.

Damage caused by insects, natural disasters, and damage caused by plant diseases show no significantly increasing trend from 2008–2012.

The following definitions are used to explain categories of damaging factors in the figure bellow:

Human made:
Human made damage occurs as a consequence of poor management practices, over-exploitation of wood resources, illegal logging, air pollution from various sources as well as over-grazing, over-exploitation of NWFPs, hunting and other.

Damage caused by plant diseases and damage caused by insects: Forest and other wooded land where insect attack or disease has been identified as the primary cause of damage.

Natural disasters: Forest and other wooded land on which the trees have been felled or damaged by storms, wind, snow or other abiotic factors such as avalanches, landslides or flooding.

Damage caused by forest fires
Forest and other wooded land, on which the vegetation, including the trees, has been wholly or largely destroyed by fire.

Forest fires in particular show a dramatic increase in abundance amounting to a total of more than one million m³ subject to fires. In Herzegovina especially, fires are a major threat to forests. Mostly, forest fires can be considered human- and climate induced impacts as the major reasons are:

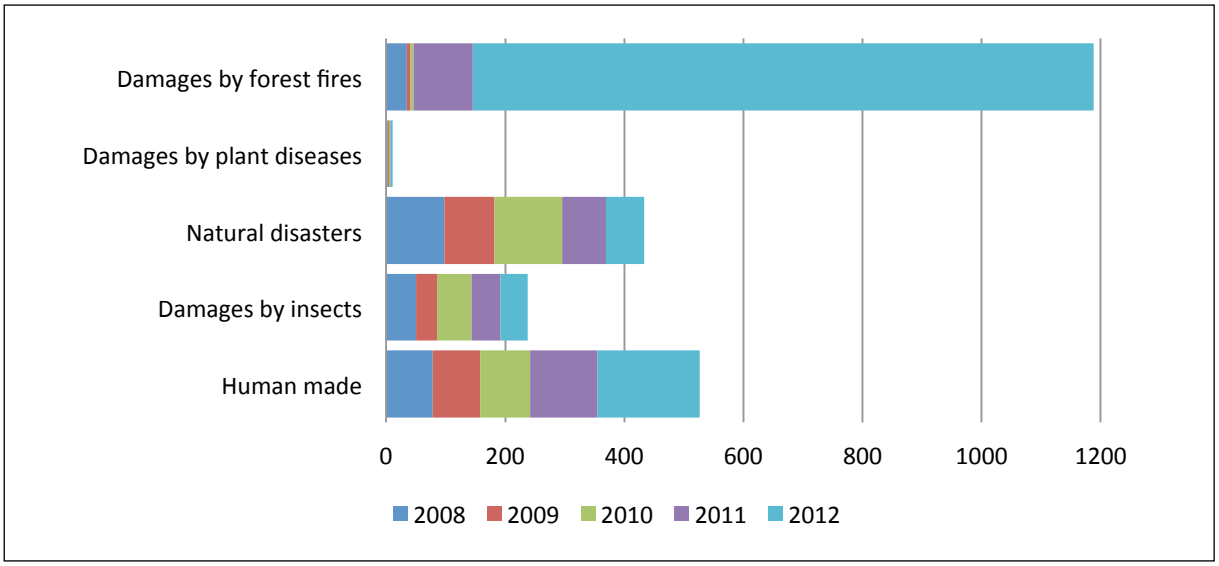
- No active fire management, high amount of fuel wood in forest;
- Low capacities and bad equipment for fire-fighting, mostly dependent on support from neighbouring countries (e.g. from Croatia);
- Ignorance about forest fire risks and prevention measures;
- Carelessness of local population and tourists.

Tables 3.9 and 3.10 display the magnitude of forest fires in RS and FBiH according to forest ownership and forest management forms.

According to the FBiH Ministry of Agriculture, Water management and Forestry, data on forest damage in FBiH is slightly different

Fig 3.4: Forest damages in BiH 2008–2012 (Institute for Statistics of RS, 2013; Institute for Statistics of FBiH, 2013)

	2008			2009			2010			2011			2012			Total for period 2008–2012		
	in thousands of m³																	
	RS	FBiH	BiH	RS	FBiH	BiH	RS	FBiH	BiH	RS	FBiH	BiH	RS	FBiH	BiH	RS	FBiH	BiH
Human made	17	61	78	18	62	80	17	67	84	25	88	113	89	83	172	166	361	527
Damages by insects	29	21	50	29	7	36	57	1	58	48	0	48	45	1	46	208	30	238
Natural disasters	88	10	98	76	8	84	106	8	114	71	2	73	59	5	64	400	33	433
Damages by plant diseases	3	0	3	2	0	2	2	0	2	1	0	1	3	0	3	11	0	11
Damages by forest fires	22	13	35	5	1	6	3	2	5	73	27	100	69	973	1 042	172	1 016	1 188



to that presented in previous table. For example, in 2012 the area affected by forest fires was reported to be 43 317 ha according to the Information on forest management in FBiH (2012) and forest management plans (2013). This difference might be due to the reason that not all cantons send all relevant data to the FBiH Ministry, but on the other hand report more accurately to the official statistical agencies.

As regards pests, spruce forests are under increased scrutiny. Bark beetle (the most serious one is European Spruce Bark Beetle - Ips typographus L.) (Mešić et al., 2012) infestations started during the war and might be a syndrome of climate change with spruce trees being prone to secondary stressors after drought and/or forest fire events.

According to data from the public forest enterprise "Šume Republike Srpske" (2013) significantly increasing populations of gypsy moth (Lymantria dispar) were recorded in 2006 and 2012. In 2012, higher populations of gypsy moth were recorded in the following forest management units: Banja Luka, Gradiška, Doboj, Vrbanja, Borja, Prijedor,

Table 3.9: Damages from forest fires in RS - Public and private forests (Institute for Statistics of Republika Srpska, 2013

	Total				State owned forests				Private owned forests			
	aflame area (ha)				aflame area (ha)				aflame area (ha)			
years	total	ground forest fires	high forest fires	felled timber (m^3)	total	ground forest fires	high forest fires	felled timber (m^3)	total	ground forest fires	high forest fires	felled timber (m^3)
2008	5 646	5 634	12	28 472	4 768	4 756	12	21 640	878	878	-	6 832
2009	1 281	1 159	122	5 354	755	633	122	5 166	526	526	-	188
2010	1 398	1 392	6	4 878	1 325	1 319	6	3 138	373	373	-	1 740
2011	20 378	20 312	66	109 736	14 619	14 553	66	73 382	5 759	5 759	-	36 354
2012	33 781	33 167	614	177 761	24 379	23 765	614	69 455	9 402	9 402	-	108 306

Table 3.10: Damages from forest fires in FBiH – forest regimes as regards area and number of occurrences (Source: Institute for Statistics of –FBiH, 2013)

years	Total	Forests							Other areas	
		High forests		Coppice forests		Other forest types				
	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)	Number	Area (ha)
2008	543	5 385	141	677	172	783	122	707	108	3 218
2009	336	1 881	105	428	123	516	40	222	68	715
2010	207	819	57	125	72	164	26	152	52	378
2011	765	7 432	285	1 868	210	1 180	94	1 912	176	2 472
2012	1 538	45 837	528	10 356	649	11 010	185	13 534	176	10 937

Majevica, Drina and Birač, covering a total area of 80 629 ha (roughly 75 percent in public forests and 25 percent in private forests). Together with intensive monitoring of affected forest stands, mechanical removing was implemented on the affected area in order to prevent further expansion.

Furthermore, recent research on the influence of harmful agents on spruce shows that mechanical injuries of standing trees in the process of wood exploitation are the main preconditions for rot (particularly central trunk rot). The species that most commonly cause rot problems in spruce stands are Heterobasidion annasum (Fr.) Bref. and Armilaria sp. which mainly affect trees with larger diameters (Treštić et al., 2013).

3.7 Production of forest goods

The production of timber is the most important objective of forest management in BiH. However, data on the exact amount of timber used annually is ambiguous.

Recent NFI data taken from (Table 3.11, USAID, 2012) suggests that 5.7 million m^3 is harvested per year as a 10-years average. As compared to an annual increment of more than 11 million m^3 this means that only around 50 percent of the annual increment is used for wood production, which is an extremely low value. The harvesting rate in coppice forests is at a rate of 43 percent even more marginal.

Table 3.11: Increment and fellings in BiH (USAID, 2012)

Forest types	Public owned		Private owned			Total in BiH
	1 000 m^3	m^3 per ha	1 000 m^3	m^3 per ha	1 000 m^3	m^3 per ha
Growing stock						
High forests	299 630	282	53 968	202	-	266
Coppice forests	35 710	87	46 412	107	-	97
Total	335 340	228	100 380	143	-	201
Total annual volume increment						
High forests	7 481	7.03	1 622	6.1	9 087	6.83
Coppice forests	907	2.22	1 192	2.75	2 095	2.48
Total	8 348	5.67	2 814	4.09	11 182	5.16
Average annual felling*						
High forests	4 416	4.15	446	1.68	4 819	3.62
Coppice forests	307	0.75	598	1.38	899	1.07
Total	4 723	3.21	1 044	1.5	5 718	2.63

*Average fellings in the last 10 years

Table 3.12: Production of timber as per assortments from 2006–2013

(Agency of Statistics BiH, 2007–2013)

Year	m^3							
	2006	2007	2008	2009	2010	2011	2012	2013
Total	4 104 333	3 752 936	4 010 888	3 429 025	3 614 899	3 500 351	3 786 369	4 024 171
Coniferous	1 749 471	1 591 946	1 722 003	1 395 745	1 577 825	1 580 277	1 753 822	1 944 451
Logs	1 349 294	1 195 805	1 308 068	1 028 723	1 060 401	1 047 823	1 176 542	1 256 218
Mining wood	112 518	102 532	108 615	83 812	102 254	118 818	112 860	136 472
Other long coniferous wood	129 427	113 540	116 007	76 717	83 013	92 945	74 783	14 396
Cord coniferous wood	144 990	168 622	181 540	204 261	330 437	318 806	388 066	536 315
Coniferous firewood	13 242	11 447	7 773	2 232	1 720	1 885	1 571	1 050
Broadleaf	2 354 862	2 160 990	2 288 885	2 033 280	2 037 074	1 920 074	2 032 547	2 079 720
Logs	800 490	727 703	733 200	568 364	597 570	567 670	613 353	643 300
Mining wood	8 069	8 776	6 368	6 954	7 140	5 879	4 886	3 666
Other long broadleaf wood	12 180	14 621	13 170	13 100	16 355	13 599	17 344	15 941
Cord broadleaf wood	87 682	81 216	103 485	117 591	157 552	127 066	130 651	82 008
Broadleaf firewood	1 445 806	1 328 326	1 432 371	1 326 714	1 257 769	1 205 142	1 266 259	1 334 378
Other roughly processes wood	635	348	291	557	688	718	54	427

The official statistical data on timber sales does not fully correspond to the NFI data (2006–2009) of the annual harvest. Table 3.12 shows the trend of timber production for 2006–2013.

We can see that timber sales solidified in 2013 after poor results between 2009 and 2012, which might be explained by the global financial crisis and the regression of wood-processing industries in Europe.

Furthermore, it can be shown that there is large discrepancy between harvested and marketed volumes. The reasons for this may be manifold, and are usually a conglomerate of issues:

- Incomparability of NFI statistical approach with factual market reports
- Incomplete reporting of harvesting and sales
- Private consumption and non-marketed wood, esp. fire wood
- Illegal logging and marketing

However, it can be concluded that although only 50 percent of the annual increment is used, less than 40 percent is reported to be officially marketed.

The second major category of forest products in BiH is the often underestimated group of non-wood-forest products (NWFP). NWFP are an important aspect for maintaining and strengthening the productive functions of forests and helping to create a broader portfolio of forest productivity that will secure viable forest management and development of rural areas (Wolfslehner et al., 2014).

In BiH, this segment shows some viability beyond the average of Europe, with medicinal and aromatic plants being key. Although official data is missing, it is estimated that around 85 percent of marketed NWFP are exported (USAID, 2012). In addition, non-marketed NWFP contributes greatly to private consumption and sustaining livelihoods. The further implications of NWFP are outlined in section 6.

3.8 Summary

BiH is the country with the highest forest share and the highest diversity of forest types in the Western Balkans. BiH has a similar amount of forest available for wood supply as both Serbia and Croatia, and along with Croatia the highest growing stock per ha in the region. The amount of private forest owners is lower than in Serbia, Montenegro, and Croatia, which implies a rather public forest-dominated landscape. As regards use of timber, BiH and Croatia have the highest felling/increment ratio, while still staying wide below using the annual increment (Sources: MCPFE, 2011, FRA 2010).

In summary, the following issues are relevant in BiH:

- Forest resources; i.e. area, growing stock, biomass and carbon are higher than estimated and communicated so far, and constitute a substantial wealth of natural resources in BiH;
- Forests in BiH are under-used in comparison to the annual allowable cut in both private and public forests. This means there is potential for wood mobilization in some areas, especially in those areas that are currently not productive or inaccessible;
- Forest inventory must be published and applied as one of tools for SFM planning and policy making;
- BiH has one of the richest forest type diversities in Europe. Geographical heterogeneity demands spatially explicit

use forms and has to go beyond schematic forest management approaches;

- The high amount of coppice forests requires dedicated objectives. Coppice forests are a potential treasure trove of biodiversity, but also have potential as a biomass source. Specific programmes to reach private forest owners (the main holders of coppice forests) are needed;
- Human-induced impacts form the major source for forest damages. Among others, the trend of forest fires gives reason for alert. Programmes are needed for fire management, awareness campaign for forest fire risks and prevention measures (including tourists);
- NWFP are an important aspect of maintaining and strengthening the productive functions of forests and help create a broadened portfolio of forest productivity that shall secure a viable forest management and development of rural areas.

4. Land use and land use change

Land use change is one of the major challenges in transition countries, and especially in war-stricken countries such as BiH. This affects forestry and rural development in terms of how land is continuously and efficiently managed, in terms of demographic and migration trends, and regarding economic development in rural areas. As a consequence, land use changes impact the preservation and maintenance of land productivity, provision of good and ecosystem services, as well as social structures, traditional knowledge and know-how.

In the following chapter, we examine:

- Land use change patterns
- Demographic changes
- Competing land use forms
- Changes in forest land

4.1 Land use change patterns in BiH

Land use in BiH has been strongly affected by the war and post-war developments in the country following the post-Yugoslavian developments.

There has been a clear trend of land use change with different manifestations as regards the shaping of rural areas and agricultural and forest areas. The major impact on land use is a large scale migration of the population within the country resulting in intensified urbanization and the appearance of abandoned land as a counterpart. More specifically, two underlying mechanisms can be summarized.

First, there is stronger urbanization and transformation of traditional cultural land use forms. Custovic and Ljusa (2013) report a significant land use change between 1998 and 2006 in terms of agricultural land being transformed to artificial areas, discontinuous urban areas, semi-natural areas, water surface area, and into complex cultivation patterns based on CORINE land cover. This means that it is human-induced pressure – especially around cities and settlements – that leads to loss of natural and semi-natural area due to urbanization tendencies. However, in the absence of any updated maps and spatial planning instruments this development is not recorded in any registers and is out of sight of rural and spatial planning and development.

Furthermore, as there are no agreed technically sound modalities for land valuation; there is an imperfect market of land per se. As a consequence of not properly valuing land properties, it is perceived as cheap resource, and used as a pretext for changing the land designation from agriculture to building land. This situation favours peri-urbanization of land at the cost of both losing natural and cultural landscape, and relocating people from high-priced areas to marginal land. Unreliable public registers and problems associated with the registration of transactions as well as formal process of inheritance, have aggravated these trends, and had a negative impact on the marketing and development of real estate market.

Since the process of land restitution is not entirely finished, there is an indication that there is a high competition for peri-urban sites with high value and distribution activities towards marginal, rural areas supported by strong political lobbying. On the other hand, dislocating people from their home areas, or moving them to cities will foster continuous alienation from their home land and from rural areas in general.

Fig. 4.1: Landmine situation in BiH as of September 2008 (Diotime, 2009)

Secondly, and more important for forests, there is a trend of land abandonment following the trend of urbanization that affects the amount and management of forest land. The trend of land abandonment started in the 1960s and found a second peak during the war. In many cases, rural populations displaced during the war did not return to pre-war settlements and many villages are still abandoned. During the war between 1992 and 1995, over half of the pre-war population of the country has been displaced from their homes (Toal and O'Loughlin, 2009). In addition, land mine contamination is still a relevant factor for land use change in BiH. In 2008, 3.4 percent of the territory of BiH was reported to be mined, showing particular mining corridors across the country (Fig. 4.1). Land areas which are still mined face less land utilization and are subject to non-management and re-wilding as well.

All these factors may have a positive effect on forest area and resources in the sense that natural afforestation and re-wilding take place on abandoned agricultural land. Indeed, a significant share of the increase of forest area as demonstrated by the NFI 2006–2009 may be explained by this trend of natural afforestation.

Currently, plans to reduce the land mine situation are not operational, due mainly to financial constraints. It is assumed that it would take at least 30 years to clear all mines.

On top of that, forests are the last priority for clearing: they are less accessible and are thus more expensive to clear, and settlements and agricultural lands are prioritised for action.

4.2 Demographic changes

Understanding the demographic changes is essential for studying the social pillar of rural development. The process of migration of people from rural to urban areas in the former Yugoslavia had started already just after World War II. Like in many eastern countries with command economies, the process of industrialization was very intensive in the period between the 1960s and 1990s. New and huge capacities in so-called "industrially developed" cities demanded a lot of man power, particularly workers directly involved in production processes requiring only lower education. As a consequence, many villages and small remote settlements become almost abandoned. In the next wave, BiH underwent severe changes in population due to the 1992–1995 war and post-war reconstitution and resettlement. During the war dislocation of population and ethnic cleansing affected more than 50 percent of the population (Toal & O'Loughlin, 2009), which was never fully restored in post-war BiH. Valenta and Ramet (2010) summarize that at least 800 000 people from BiH emigrated in the years 1993–1994, of which some 200 000 have not returned until 2005. Although largely unexplored and underestimated in official statistics, there is a clear indication of demographic changes in BiH. Moreover, it has to be assumed that the trends continued with people moving from rural to urban areas, and younger people moving from rural areas to cities or abroad due to economic pressure.

The recent census data (released in November 2013)[16] provides the first official information on population magnitude in BiH since 1991. The preliminary results give figures at municipality level; further analyses on population structure are announced for 2014–2016.

A very-up-to-date comparison of population development is shown in table 4.1. Due to administrative changes in post-war BiH, a re-arrangement of municipalities has to be carried out in order to make data comparable.

In total, BiH has suffered a population loss of more than 13 percent since 1991, reported at about 3.79 million inhabitants. In addition to war casualties and war-bound effects, huge migration set in, both to former Yugoslav states and to the rest of the world. Reflecting on some interim estimation we can see that the population has stabilised since 2003 with almost no growth.

Out of 100 municipal cells, 80 show a general decline in population, 38 have a decrease of more than 20 percent, and seven municipal cells have lost more than 50 percent of their population since 1991, the last group consisting of the municipalities of Bosansko Grahovo, Drvar, Glamoč, Kalinovik, Srebrenica, Vareš and Vlasenica.

As we can see, rural areas are widely affected by population decline with severe potential impacts on rural development. As regards the census data, information on the age structure in urban and rural areas would be especially interesting, although such data is not yet available.

16 Agency of Statistic of BiH, 2013

Table 4.1 Comparison of population development in BiH

Municipality	1991	2013	difference	percent
Sarajevo	527 049	438 443	-88 606	-16.8
Banovići	26 590	23 431	-3 159	-11.9
Banja Luka	195 692	199 191	3 499	1.8
Bihać	70 732	61 186	-9 546	-13.5
Bijeljina	96 988	114 663	17 675	18.2
Bileća	13 284	11 536	-1 748	-13.2
Bosanska Dubica/Kozarska Dubica	31 606	23 074	-8 532	-27.0
Bosanska Gradiška/Gradiška	59 974	56 727	-3 247	-5.4
Bosanska Krupa+Buzim+Krupa na Uni	58 320	51 644	-6 676	-11.4
Bosanska Brod/ Brod	34 138	17 943	-16 195	-47.4
Bosanski Novi/Novi Grad+Kostajnica	41 665	35 107	-6 558	-15.7
Bosanski Petrovac+Petrovac	15 621	8 313	-7 308	-46.8
Bosanski Šamac/Šamac+Domaljevac-Šamac	32 960	24 257	-8 703	-26.4
Bosansko Grahovo	8 311	3 091	-5 220	-62.8
Bratunac	33 619	21 619	-12 000	-35.7
Brčko	87 627	93 028	5 401	6.2
Breza	17 317	14 564	-2 753	-15.9
Bugojno	46 889	34 559	-12 330	-26.3
Busovača	18 879	18 488	-391	-2.1
Cazin	63 409	69 411	6 002	9.5
Čajniče	8 956	5 449	-3 507	-39.2
Čapljina	27 882	28 122	240	0.9
Čelinac	18 713	16 874	-1 839	-9.8
Čitluk	15 083	18 552	3 469	23.0
Derventa	56 489	30 177	-26 312	-46.6
Doboj+Doboj jug + istok	102 549	92 498	-10 051	-9.8
Donji Vakuf	24 544	14 739	-9 805	-39.9
Drvar	17 126	7 506	-9 620	-56.2
Foča	40 513	22 024	-18 489	-45.6
Fojnica	16 296	13 047	-3 249	-19.9
Gacko	10 788	9 734	-1 054	-9.8
Glamoč	12 593	4 038	-8 555	-67.9
Goražde+Novo Goražde	37 573	25 471	-12 102	-32.2
Gornji Vakuf	25 181	22 304	-2 877	-11.4
Gračanica	59 134	48 395	-10 739	-18.2
Gradačac+Pelagićevo	56 581	63 913	7 332	13.0
Grude	16 358	17 865	1 507	9.2

17 Agency of Statistics BiH, 2013

Han Pijesak	6 348	3 844	-2 504	-39.4
Jablanica	12 691	10 580	-2 111	-16.6
Jajce+Jezero	45 007	32 099	-12 908	-28.7
Kakanj	55 950	38 937	-17 013	-30.4
Kalesija+Osmaci	41 809	42 920	1 111	2.7
Kalinovik	4 667	2 240	-2 427	-52.0
Kiseljak	24 164	21 919	-2 245	-9.3
Kladanj	16 070	13 041	-3 029	-18.8
Ključ+Ribnik	37 391	25 331	-12 060	-32.3
Konjic	43 878	26 381	-17 497	-39.9
Kotor Varoš	36 853	22 001	-14 852	-40.3
Kreševo	6 731	5 638	-1 093	-16.2
Kupres	9 618	5 893	-3 725	-38.7
Laktaši	29 832	36 848	7 016	23.5
Livno	40 600	37 487	-3 113	-7.7
Lopare+Celic	32 537	28 651	-3 886	-11.9
Lukavac+Petrovo	57 070	53 741	-3 329	-5.8
Ljubinje	4 172	3 756	-416	-10.0
Ljubuški	28 340	29 521	1 181	4.2
Maglaj	43 388	24 980	-18 408	-42.4
Modriča	35 613	27 799	-7 814	-21.9
Mostar	126 628	113 169	-13 459	-10.6
Mrkonjić Grad	27 395	18 136	-9 259	-33.8
Neum	4 325	4 960	635	14.7
Nevesinje	14 448	13 758	-690	-4.8
Novi Travnik	30 713	25 107	-5 606	-18.3
Odžak+Vukosavlje	30 056	26 715	-3 341	-11.1
Olovo	16 956	10 578	-6 378	-37.6
Orašje+Donji Žabar	28 367	25 627	-2 740	-9.7
Posušje	17 134	20 698	3 564	20.8
Prijedor	112 543	97 588	-14 955	-13.3
Prnjavor	47 055	38 399	-8 656	-18.4
Prozor	19 760	16 297	-3 463	-17.5
Rogatica	21 978	11 603	-10 375	-47.2
Rudo	11 571	8 834	-2 737	-23.7
Sanski Most+Oštra Luka	60 307	50 356	-9 951	-16.5
Skender Vakuf/Kneževo+Dobretići	19 418	12 469	-6 949	-35.8
Sokolac	14 883	12 607	-2 276	-15.3
Srbac	21 840	19 001	-2 839	-13.0
Srebrenica	36 666	15 242	-21 424	-58.4
Srebrenik	40 896	42 762	1 866	4.6

Stolac	18 681	14 889	-3 792	-20.3
Šekovići	9 629	7 771	-1 858	-19.3
Šipovo	15 579	10 820	-4 759	-30.5
Široki Brijeg	27 160	29 809	2 649	9.8
Teslić	59 854	41 904	-17 950	-30.0
Tešanj+Usora	48 480	53 703	5 223	10.8
Tomislavgrad	30 009	33 032	3 023	10.1
Travnik	70 747	57 543	-13 204	-18.7
Trebinje+Ravno	30 996	34 761	3 765	12.1
Tuzla	131 618	120 441	-11 177	-8.5
Ugljevik+Teočak	25 587	24 145	-1 442	-5.6
Vareš	22 203	9 556	-12 647	-57.0
Velika Kladuša	52 908	44 770	-8 138	-15.4
Visoko	46 160	41 352	-4 808	-10.4
Višegrad	21 199	11 774	-9 425	-44.5
Vitez	27 859	27 006	-853	-3.1
Vlasenica	33 942	12 349	-21 593	-63.6
Zavidovići	57 164	40 272	-16 892	-29.6
Zenica	145 517	115 134	-30 383	-20.9
Zvornik+Sapna	81 295	75 822	-5 473	-6.7
Žepče	22 966	31 582	8 616	37.5
Živinice	54 783	61 201	6 418	11.7
Total	4 377 033	3 831 555		

4.3 Competing land use forms

Since population pressure and intensity of land use are widely shrinking, competition for land use in BiH is not a pre-dominant phenomenon as observed in other, partly densely inhabited countries in Europe. There is modest afforestation on agricultural and industrial land and natural reforestation compensated for by partial loss of forests to designations such as dam construction for hydropower plants, construction of small-scale hydropower plants, opening of quarries, or construction of road infrastructure (notwithstanding that forest net loss might occur in urban and peri-urban areas to extension of urban infrastructure in general). In particular, in the wake of reconstruction, artificial surfaces have significantly increased at the cost of agricultural areas and semi-natural areas (Vojniković et al. 2013).

Coal mining has a significant impact on land use reforms. Coal is exploited at an area of 18 000 ha, while waste materials are disposed of at an area of almost 6 000 ha. These locations mostly consist of meadows, arable areas and forests which have been degraded (MDGAF, 2012).

However, the issue of land use is rather affected by lacking or inconsistent land use and spatial planning and enforcement and implementation of planning and controlling instruments then by a direct competition

among land use forms. This entails:

- Weak implementation of spatial planning of land as a resource and non-transparent estate trading;
- Uncoordinated settlement processes and lacking guidance and controlling;
- Weak implementation of environmental standards in industries and exploitation of natural resources; e.g. mining;
- Lack of investment and capital structure in industry that supports unsustainable use of land.

In addition, rural poverty evokes major pressure on forest land. Rural areas are predominantly poor, low income areas, which has led to increased exploitation of forests, especially in terms of particular demand for firewood and illegal activities of harvesting and marketing wood resources.

4.4 Impacts on forests

We have observed that the major impacts of land use and demographic change on forests lie in the abandonment of land and (natural) increase of forest area. In practice, this means an increase of biomass, but a decline of active forest management and quality production of timber. In consequence, re-forested areas have turned into unmanaged forests of pioneer species or shrubs, and former managed coppice forests are no longer looked after. Both developments are not considered to support the development of higher value chains for forest goods and services.

Indeed, it is important to know not only about the boundary development of forests (i.e. gain/loss of forest areas), but also about change effects within the use form "forest"/"forest management", and spatially explicit.

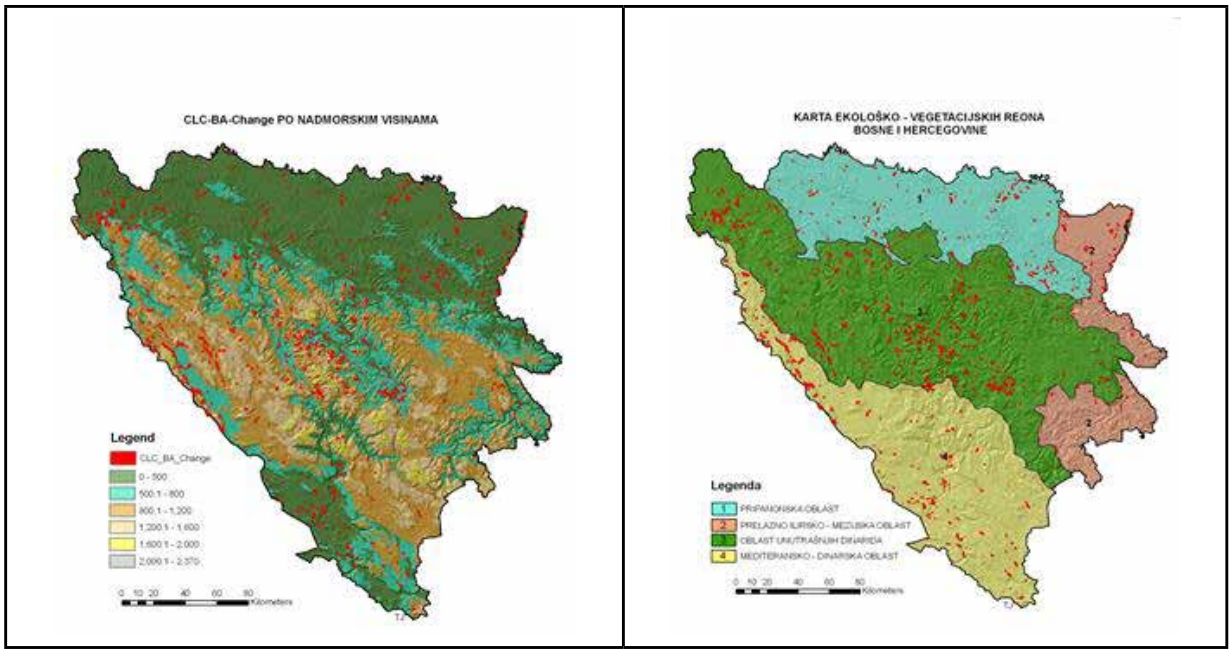
Vojniković et al. (2013) demonstrated in an analysis based on CORINE land cover data 2000-2006 some explicit forest development patterns. It was shown that on 48 622 ha in BiH changes in land use occurred; i.e. approximately 1 percent of the land cover. More specific land use changes, which primarily affected agricultural and forest land are shown in table 4.2. The most significant changes occurred in the Inner Dinaric region, with a total area of 19 197 ha. The least significant changes are in the Illyric-Moesian transitional region on a total area of 1 566 ha. The results also demonstrate that the predominant land use change phenomenon is a shift from forest vegetation to lower value forest types of primary successions, which has severe implications for the economic potential and value creation of the forest land in these regions.

Moreover, the analysis results show that the most frequent changes occur in the Inner Dinaric region at altitudes of between 801 and 1 200 m. In addition, changes occurring in the Mediterranean-Dinaric region at the altitudes ranging from 0 to 500 m on the entire territory of BiH are also significant (Fig 4.2). The major patterns detected are the transformation of forest vegetation successions (and coppice forests) to high forests with higher economic value in the mid-ranges, while significant abandonment of agricultural areas and formation forest vegetation successions at low altitudes in the Peripannonian region.

Table 4.2. Major changes in the structure of land cover in specific land cover classes on the territory of BiH for the period 2000-2006 (Vojniković et al. 2013)

Region	Changes in CLC 2000 -2006	Changed area (ha)	Changed number of polygons
	Class name (from class to class)		
Mediterra-nean-Dinaric region	**broad-leaved forest to forest vegetation successions**	**5 905.00**	**81**
	thermophilous vegetation to burned areas	1 151.12	17
	complex soil cultivation system to discontinuous urban areas	197. 38	17
	mixed forest vegetation to forest vegetation successions	458. 32	12
Inner Dinaric region	**broad-leaved forest to forest vegetation succession**	**9 595.85**	**220**
	forest vegetation successions to broad-leaved forests	**4 691.21**	**92**
	forest vegetation successions to mixed forests	894.05	30
	coniferous forest to forest vegetation successions	1 227.49	31
	forest vegetation succession to coniferous forests	696.03	18
	complex soil cultivation system to discontinuous urban areas	1 713.72	68
	areas mostly used for agriculture with significant areas of natural vegetation to discontinuous urban areas	378.80	23
Peripanno-nian region	forest vegetation succession to broad-leaved forests	1 814.35	34
	complex soil cultivation system to discontinuous urban areas	1 261.48	52
	non-irrigated arable land to discontinuous urban areas	619.33	22
	areas mostly used for agriculture with significant areas of natural vegetation to discontinuous urban areas	272.97	19
Illyric-Moesian region	broad-leaved forests to forest vegetation successions	659.15	25
	complex soil cultivation system to discontinuous urban areas	486.29	19
	non-irrigated arable land to discontinuous urban areas	421.20	10

Fig. 4.2: Maps of BiH of land use change with regard to (a) elevation, (c) ecoregions in BiH (Vojnikovic et al. 2013)



4.5 Summary

BiH shows very similar rural development patterns to the other Western Balkan countries, which all show decreasing populations, especially in rural areas. In BiH, Croatia and Serbia net depopulation has been observed. Problems caused by mining are predominant across the region. What is significant in BiH, is the ethnic split that leads to additional demographic phenomena and difficulties in land use management.

The main issues for rural development in BiH are:

- Population decrease and land abandonment impose a major obstacle to rural development in general. In many cases, rural populations displaced during the war have not returned to pre-war settlements and many villages are still abandoned. Also, an ageing population in rural areas can be assumed;
- Human-induced pressure especially around cities has led to a loss of natural and semi-natural areas due to urbanization;
- In line with missing planning instruments, there is evidence that the political framework for land use management and spatial planning is insufficient;
- Land use is affected by lacking or inconsistent land use and spatial planning and enforcement and implementation of planning and controlling instruments then by a direct competition among land use forms. This suggests weak implementation of spatial planning of land as a resource and non-transparent estate trading, uncoordinated settlement processes and a lack of guidance and control, weak implementation of environmental standards in industries and exploitation of natural resources; e.g. mining, as well as a lack of investment and capital structure in industry that supports unsustainable use of land;
- There are no proper modalities for land valuation, which is why there is an imperfect land market *per se*, on which land is not properly valued, is perceived as a cheap resource, and is used as a trading-in for changing the land designation; e.g. from agriculture to building land;
- Unreliable public registers and problems associated with the registration of transactions have stipulated these trends, and have had a negative impact on the marketing and development of real estate market;
- Since the process of land restitution is not entirely finished, there is an indication that there is a match of power for peri-urban sites with high value and distribution activities towards marginal, rural areas supported by strong political lobbying;
- Land mine contamination is still a relevant factor for land use change in BiH. Land areas which are still mined face less land utilization and are subject to non-management and re-wilding as well;
- Rural poverty put major pressure on forest land, especially in terms of firewood demand and illegal activities of harvesting and marketing wood resources;
- The predominant land use change phenomenon in forests is a shift from forest vegetation to lower value forest types of primary successions, which has severe implications for the economic potential and value creation of the forest land in these regions.

5. The forest-based sector

5.1 Definition of the sector

In the context of this study, the forest-based sector includes: forestry, sawmilling, pulp and paper, the fibre industry and bioenergy. Although during socialism (before the war 1992–1995), all these industries were integrated in a number of huge state companies called SOURs (translation: Complex Organizations of Integrated Work) like ŠIPAD, KRIVAJA and INCEL, forestry and wood-based processing industries are now clearly divided. At all administrative-political levels, forestry is the responsibility of ministries for agriculture, water management and forestry (in some cases this is simply the Ministry of economy) while wood-processing industries (sawmilling, pulp and paper) in both entities are under the responsibility of ministries for industry, energy and mining. There is also a difference in terms of type of companies dealing with forestry (public companies established by cantonal authorities in FBiH and entity authorities in RS) and wood-processing industries (mainly private companies). According to Article III. of the Constitution of BiH (Responsibilities of and relations between the institutions of Bosnia and Herzegovina and the entities), the following matters are the responsibility of the institutions of Bosnia and Herzegovina: foreign affairs; foreign trade; customs and monetary policies; finances of the institutions and for the international obligations of BiH; immigration, refugee and asylum policy and regulations; international and inter-entity criminal law enforcement (including relations with Interpol); establishment and operation of common and international communications facilities; regulation of inter-entity transportation and air traffic control.

In forestry, however, the Constitution of BiH transfers competences to entity level (FBiH and RS) and Brčko district. The institutions at

Table 5.1: Responsible ministries for subsectors within forest-based sector

		Forestry	Sawmilling	Pulp & paper	Bioenergy
State level		Ministry of Foreign Trade and Economic Relations	Ministry of Foreign Trade and Economic Relations	Ministry of Foreign Trade and Economic Relations	Ministry of Foreign Trade and Economic Relations
Entities	**FBiH**	Ministry of Agriculture, Water Management and Forestry	Ministry of energy, mining and industry	Ministry of energy, mining and industry	Ministry of energy, mining and industry
	RS	Ministry of Agriculture, Forestry and Water Management	Ministry of industry, energy and mining	Ministry of industry, energy and mining	Ministry of industry, energy and mining
Brčko district		Department of Agriculture, Forestry and Water Management	Department for economy	Department for economy	Department for economy
Cantonal level		Ministries of Agriculture, Water Management and Forestry (Except some cantons: Bosansko-podrinjski, Zapadnohercegovački and Canton Sarajevo, where the Ministry of Economy is responsible for forestry)	Ministries of economy (Except Tuzla Canton where the Ministry of development and entrepreneurship and Posavski Canton where the Ministry of economy and spatial planning are responsible for forestry)	Mainly within the cantonal Ministries of economy	Mainly within the cantonal Ministries of economy

the two entities and Brčko district levels are responsible for drafting and implementing forest policy and legislation. In the FBiH, these responsibilities are even more decentralized down to cantonal level. Part III. Of the Constitution of FBiH (Division of responsibilities between the Federation and the cantons) describes that the Federation (among other responsibilities) shall have exclusive responsibility for economic policy and land use policy at FBiH level, but both the Federation Government and the Cantons shall have responsibilities for environmental policy and use of natural resources. As appropriate, these responsibilities may be exercised jointly or separately, or by the Cantons as coordinated by the Federation Government. Table 5.1 shows the responsibilities of sub-sectors in BiH on state level and in different entities.

5.2 Forestry

The organization of the forestry sub-sector is a complex issue and differs between the entities and Brčko district.

In FBiH the ownership of the public forest resource rests with FBiH which transfers management rights to ten Cantons. The Cantons transfer these rights to Cantonal Forest Management Companies (only one in each canton), which are established in compliance with the Law on Forests from 2002. In seven cantons these Cantonal Forest Management Companies are established as 100 percent public companies owned by the Canton. The only exception is Canton 3 (Tuzla Canton), where the Cantonal Forest Management Company has been established as a joint stock company. This organization is not fully implemented in two cantons; in Canton 2 (Posavina Canton) – lowland area where forests play minor role and Canton 7 (Herzegovina-Neretva Canton) where some municipality-based companies are not integrated in existing Cantonal Forest Management Company. At the level of the Federation there is a Forestry Department within the Ministry of Agriculture, Water Management and Forestry with a unit responsible for legal matters (all aspects relating to forest law and related legislation) and an FBiH Forest Office (FFO) which deals with forestry development and support and has an overall monitoring role. At the Cantonal level, responsibility for forestry rests with the relevant Ministry within which there is a Cantonal Forest Office (CFO) whose main function is to control the activities of the cantonal forest management company and provide advice and support to private forest owners.

In Republika Srpska, there is the Forestry Department within the Ministry of Agriculture, Forestry and Water Management, which is responsible for forests and forestry. Public forest company Šume RS manages the public forests in RS. It has a hierarchical organizational structure with headquarters, twenty five Forest Management Units (FMUs), a Research Development and Design Centre, which undertakes forest management planning, a Centre for Seedling Production and a Karst Management Centre. Each FMU has a sub account, although all financial flows essentially go through the headquarters. The FMUs report to the headquarters and are managed on a Forest Management Area (FMA) basis, comprising a number of Forest Districts.

In Brčko district, where forestry plays a subordinated role, there is the Department for Agriculture, Forestry and Water

Table 5.2. Summary of public forest companies in BiH

	Name of the Company	Establisher of the company	Type of company	Management area ha	Place	Web site
1.	**Javno preduzeće šumarstva "Šume Republike Srpske", akcionarsko društvo Sokolac**	Government of Republika Srpska	Joint-stock company	1 000 040	Romanijska 1/3, Sokolac	http:// www.sumers.org/
2.	**Industrijske Plantaže AD, Banja Luka**	INCEL (80 percent owned by RS)	Joint-stock company	7 500 (forest plantations)	Veljka Mlađenovića bb, 78000 Banja Luka	http:// www.industrijskeplantaze.com/
3.	**Šumsko privredno društvo "Unsko-sanske šume" d.o.o. Bosanska Krupa**	Assembly of Unsko-sanski Canton	Limited liability company	179 977.90	Ulica Radnicka bb. Bosanska Krupa	http://ussume.ba/
4.	**Šumsko privredno društvo ˝Srednjobosanske šume˝ d.o.o. Donji Vakuf**	Assembly of Srednjobosanski Canton	Limited liability company	185 949	Ulica 770. Slavne brdske brigade 20, Donji Vakuf	http:// www. sumesb. com.ba/
5.	**Javno preduzeće Šumsko - privredno društvo Zeničko-dobojskog kantona d.o.o Zavidovići**	Assembly of Zeničko-dobojski Canton	Limited liability company	182 389.20	Ulica Alije Izetbegovića 25, Zavidovići	http:// www.spdzdk.ba/
6.	**Šumsko gospodarsko društvo "Hercegbosanske šume" d.o.o. Kupres**	Assembly of Canton 10	Limited liability company	284 619	Splitska bb, Kupres	http:// www.hbsume.ba/
7.	**Javno preduzeće "Šume Tuzlanskog Kantona" dioničko društvo**	Assembly of Tuzla Canton	Joint-stock company	72 435	Fadila Kurtagića 1, Kladanj	www.jpsumetk.ba
8.	**Kantonalno šumsko privredno Društvo za gospodarenje državnim šumama "Sarajevo-šume" d.o.o. Sarajevo**	Assembly of Canton Sarajevo	Limited liability company	70 746.80	Ul. Maršala Tita, Br. 7/ II, Sarajevo	http:// www.sarajevo-sume.ba/
9.	**Javno preduzeće "Bosansko-podrinjske šume" d.o.o.**	Assembly of Bosansko-podrinjski Canton	Limited liability company	24 970.40	Ibrahima Popovića 17, Goražde	http:// sumebpk.com/
10.	**Šumsko gospodarsko društvo Županije Zapadnohercegovačke d.o.o. Posušje**	Assembly of Zapadnohercegovački Canton	Limited liability company	28 515.50	Kralja Tomislava 5, Posušje	
11.	**Javno preduzeće "Šume Herceg Bosne" d.o.o. Mostar**		Limited liability company		Hrvatskih branitelja bb 88000 Mostar	
12.	**Javno preduzeće Šumsko-privredno društvo "Šume Hercegovačko-neretvanske" d.o.o. Mostar**	Assembly of Hercegovačko neretvanski Canton	Limited liability company		Ulica Akademika Ivana Zovke 15, Mostar	
13.	**Šumarstvo "Ljuta"**				PP No. 6 71210 Ilidza	http:// sumarstvo-ljuta.ba
14.	**Šumarstvo "Prenj" dioničko društvo Konjic**				Sarajevska 31, Konjic	
15.	**Šumarstvo Srednjeneretvansko**				Južni logor bb Mostar	

management. Within this Department, there is Sub-Department for Forestry and Water management dealing with the implementation of forest and game-management legislation, forest management planning and executing projects, forest protection and other public administrative issues. As the majority of forests are owned by private forest owners, there is no public forest company in Brčko District.

Besides the above mentioned public forest companies, some public forests within the protected areas are managed by public institutions responsible for management of protected areas (e.g. National parks, protected landscapes etc.).

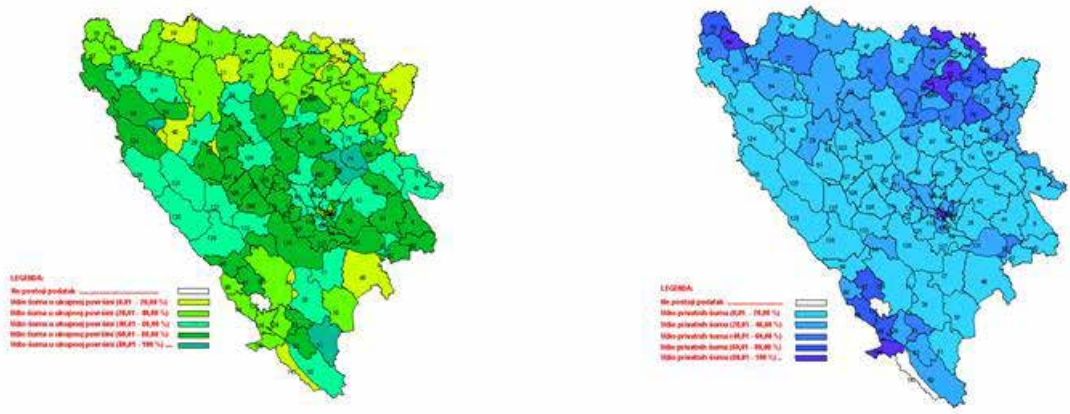
5.2.1 Land ownership structure

As shown earlier in section 3, forest land in BiH is predominantly publicly owned. Since data on the new NFI on this issue are still lacking (not published and therefore not publicly available), we have to build on the reported ratio of 80 percent public forests and 20 percent private forests with almost equal share in both entities RS and FBiH.

To show the spatial pattern of private forest ownership, two maps are displayed in Fig. 5.1 to compare both eco-regional forest distribution and forest cover percentage. It can be shown that the percentage of private forests is highest in the lowland areas where the forest coverage is the smallest, while state forests are located in areas with high forest cover.

According to the constitutional set up of the country, the ownership of public forests rests with the two entities (FBiH and RS). As concerns the Cantons (in FBiH) and municipalities (in both entities), they have no ownership rights over public forests unless they are granted it in kind or buy it. In Brčko District, there are only a few thousand hectares of public forests managed by the public forest administration (Sub-Department for Forestry and Water management). Still, the term "state forests" is widely used to refer to public forests and it can be recognized in both official documents and day-to-day life. According to the National Environmental Action Plan (2003), public forests (even in this official document the term "state forests" is used) cover 81 percent in RS and 80.43 percent in FBiH of the total forest area. According to the same source, private

Fig. 5.1: Forest cover percentage (a), and private forest land ratios (b) in BiH (Glück et al., 2010)



(a) (b)

forests occupy 19 percent in RS and 19.57 in FBiH. Still, some other sources present slightly different numbers. For example, the study "Bosnia and Herzegovina: Challenges and Directions for Reform Public Expenditure and Institutional Review" (World Bank, 2012) mention that private forests represent 18.2 percent of the forest area in FBiH and 22 percent in RS.

Private forests are mainly owned by individuals (physical persons) and in very rare cases by some institutions (e.g. religious organizations). During the socialist period, private forest ownership was ignored by national forest policy makers. Compared to the relatively intensive management of "state forests", private forests have been quite neglected by both, forest policy decision makers and private forest owners. As a result, few forest policy instruments exist in BiH to guide owners and decision makers on private forest management.

The current forest land structure and ownership pattern in BiH is heavily determined by the political and historical developments that the country has gone through. For a thorough understanding of the forest land structure, it is useful to understand the social and political context of forest land tenure development in the past. Forest land tenure and related issues in medieval Bosnia were similar to those in other European countries of that period. The royal dynasty was the sole owner of the whole territory of the Bosnian kingdom. As a reward for their loyalty, land was awarded to several Bosnian noble families. In order to keep social peace, the nobles conceded some usage rights (without transferring ownership rights) to their serfs (vassals); e.g. for fuel wood, collecting fruits, pasture etc.

When BiH was conquered by the Ottoman Empire a completely new forest ownership pattern was established. The legal base for forest land tenure was Islamic canonical law based on the teachings of the Koran and the traditions of the Prophet (the Shariat). Forests were considered as a public good and could not become subject to private ownership (Begović, 1960). Some forests, called "Baltalici", were designated for the satisfaction of the local population's needs – the complex type of usage rights which in other European countries over the time evolved to what we know nowadays as community forests. In addition, some remote forests, called "Džiboli-mubah", also existed and all were allowed to use these "free forests" without any charge, either for their own needs or for commercial purposes (Čomić, 1999). The commercial demand for forest products simply did not exist due to undeveloped business and trade. Under such circumstances there was no real need for the development of private forests as a specific type of ownership. This forest land structure was kept for centuries. In the first half of the 19th century, wood became an important raw material and gained increasing market value and Bosnian feudalists started usurping forest areas and selling their traditional usage rights to foreign forest exploitation companies, mainly from Croatia, Austria and Hungary. For the very first time, in 1858 private forest land was recognized as a legal form of forest ownership by the so called "Ramadan's Law on land tenure" if new forests were planted and cultivated by the owners themselves. The so called "Ševal's Law on forest" (1869) proclaimed all free forests ("Džiboli-mubah") as state property. By the same law all other types of forest ownership ("Baltalici", endowment forests - "Vakufi" and private forests) were temporarily put at the disposal

of the state until their ownership status had been reconsidered (Forestry encyclopaedia 1980. Volume 1, Jugoslovenski leksikografski zavod, Zagreb).

Immediately after the annexation of BiH by the Austro-Hungarian monarchy (1878), the first landscape cadastre was conducted (1880–1885) and forest ownership issues were regulated in accordance with "Ševal's Law on forest" from 1869. "Baltalici" remained property of the state although some restricted users' rights of the local population were recognized (so-called "Meremat" right of local rural population). In this context, communal forests as a special type of forest ownership were abolished. For the purpose of achieving Austro-Hungarian political aims, some forest areas were given to private owners, mainly to powerful local feudalists. Consequently, at the end of the 19th century private forests in BiH amounted to about 550 000 ha (Forestry encyclopaedia 1980).

The Forest Law of the Yugoslavian monarchy from 1929 significantly affected private forest estates. According to this law the state intervenes in forest estates that are greater than 300 ha (Sabadi, 1994). At this time the average size of private forest properties was already much less than 300 ha as a result of permanent chopping and inheritance. The absence of state intervention resulted in exaggerated cutting of private forests and the consequences of this, such as unsatisfactory stock volume, are still present.

Agrarian reform in the former Yugoslavia in 1945 limited the ownership of private forests to 8-30 ha, depending on terrain (Sabadi, 1994). Although it is generally considered that the agrarian reform had a very strong impact on private land ownership in the former Yugoslavia, the land nationalization process influenced mainly private agricultural properties (plough-field, pastures, hay-field etc.) while the greater part of private forest estates, due to constant inheritance, was already below the prescribed maximum of 8–30 ha. Since the 1990s, processes such as privatization, denationalization and restitution, have qualified the issue of private land ownership at the top of public policy debates. Although ownership restitution is not yet completed in BiH, the comparison of forest inventory results conducted by the Austro-Hungarian monarchy (1880–1885) with the current area of private forests in BiH, indicates that the share of private forests will probably not significantly increase as a result of the restitution process.

Bearing in mind that private forest owners in BiH are not organized in their interest associations, while their property is extremely small-scale and fragmented into a few parcels (Glück et al., 2011) the existing forest policies are developed with little or no consideration of or input from private forest owners. The official number of private forest owners in BH is not known (but estimated to be around 500 000) and there are several reasons for that. Land books and cadastre data is not completely accurate and some was destroyed during the war. Forest land is mainly a subject of family inheritance but in many cases the process of formal ownership transfer is not officially completed. As the procedure of land partition among all successors is relatively expensive and time-consuming, in many cases the land is not designated to single physical persons. The benefits the single owner could gain from obtaining his portion of the land are often lower than the costs. Thus, in many cases a group of people (usually members of the same

family) own forest property collectively. They possess equal (so-called "ideal") portions of the land, know the borders in the field and use the land mainly sporadically and for their own needs. Fuel wood for domestic purposes is predominant type of using private forests in BH and only 20 percent of private forest owners are market-oriented by selling either fuel wood or sawlogs (Glück et al. 2011).

There are some indications for increasing a share of private forests within the last 20 years. This is mainly due to general tendencies of spontaneous natural afforestation of abandoned agricultural land in rural areas.

5.2.2 Employment

In 2012, the forest sector (forestry without wood-processing industry) of FBiH employed 4 393 people (data for Canton 7 – Hercegovačko-Neretvanski Canton, are not included). 53 percent (2 330) were forestry professionals with different education/ qualification level.

From the 4 393 people employed in the forest sector of the FBiH, 2 330 (1 863 in CFMC and 467 in CFO/FFO) had formal forestry professional qualifications (53 percent). According to official statistics 4 285 people were employed in the forest sector of Republika Srpska in 2012.

The total number of people employed in the forest sector (public forest management companies and public forest administration) of both BiH's entities is 8 678. This number does not include people employed by private companies engaged in forest sector as contractors, forestry inspectors at different administrative level as well as forestry professionals employed in education and research. In general, we can conclude that public forest administration is overstaffed. This is mainly for social reasons, as public forest enterprises are often the main employers in rural areas. Besides, there is no accurate data on people employed in the forest sector in Canton 7. Adding this grey number, the total number of people employed in the forest sectors of both entities (the FBiH and the RS) of Bosnia-Herzegovina is estimated about 10 000. According to FBiH Office of Statistics (Statistical yearbook for

Table 5.3. Number of employed people in forest sector in FBiH on 31 December 2012 (Ministry of Agriculture Water Management and Forestry, 2013)

Institution	Professional qualification									
	PhD	MSc	VSS[1]	VŠ[2]	SSS[3]	VKV[4]	KV[5]	PKV[6]	NK[7]	Total
CFMC	0	22	495	68	1 513	26	902	404	465	3 895
CFO/FFO	0	2	72	4	420	0	0	0	0	498
Total	0	24	567	72	1 933	26	902	404	465	4 393
percent	0	0.5	12.9	1.6	44	0.6	20.5	9.2	10.6	100

Source: Annual information on forest management and management plans in the Federation BiH, Ministry of Agriculture Water management and Forestry, 2013

[1]VSS – University (higher education)

[2]VŠ - First degree of higher education studies (similar to Fachhochschule in Germany)

[3]SSS – Secondary school (4 years)

[4]VKV – Secondary school (4 years) with additional professional specialization

[5]KV – Secondary school (3 years)

[6]PKV – Primary school with professional training

[7]NK – Primary school

Table 5.4. Number of employed people in forest sector in the Republika Srpska in 2012.

Total	Qualified (KV) and highly qualified workers (VKV)	Forestry engineers (VSS)	Forestry technicians (SSS)	Administrative and other workers
4 285	1 318	439	1 346	1 182

Source: Statistical bulletin for Forestry, Number 13, Institute for Statistic of Republika Srpska 2013

2011), more than 16 000 people (3.7 percent of total workforce) are employed in forestry and the wood-processing industry in the Federation of BiH.

5.2.3 Income structure and revenues

Public forestry companies in BiH (in the Republika Srpska this is public company "Šume Republike Srpske", while in the Federation of Bosnia and Herzegovina these are Cantonal Forest Management Companies) are formed and controlled by governments and assemblies at different levels (in RS this is the Government and Assembly of RS, in FBiH these are cantonal governments and assemblies). According to the official sources, many public forest companies report negative financial results permanently or periodically. The highest loss in the Federation (the sum of financial results of all cantonal companies) was in 2009 (EUR 2 280 099) while in RS the highest loss reported by public company "Šume Republike Srpske", was in 2012 (EUR 2 127 675). There are some indications of financial recovery of the public company "Šume Republike Srpske". Within the first six months of 2013, the positive financial result of this company amounted to almost EUR 500 000 according to the Report on implementation of production and financial plan for period 1 January 2013 – 30 June 2013.

The establishers (representatives of legislative and executive power) completely control public forest companies, especially by influencing the election of managerial structure. It is well-known that almost all public forest companies have a surplus of employees which influence final financial results. But the establishers do not insist on profit – they rather see public forest companies as an important pillar of the local economy and a suitable instrument for maintaining "social peace", particularly in rural areas. In these areas, forestry is almost the only sector where one can get a job in the "public sector". It is particularly attractive for local people who have lower education levels. This kind of employment (as in other public companies e.g. mail, electro-distribution, school, police etc.) is highly appreciated. Everybody (politicians, managers and local population) is aware of the situation where public forest companies act as a kind of "social pressure take-off cock" and jeopardize financial effects, almost consciously.

Table 5.5. shows the income structure and revenues of state forest enterprises in BiH. The income structure of state forest enterprises is not ambitious, partly due to demands of "social" services to combat rural poverty (e.g. wood use rights).

The category of other revenues includes all other revenues that companies get for commercialization of other products and services (NWFP, hunting, mining etc.) as well as financial revenues which are related

Table 5.5: Income structure and revenues of state forest enterprises in BiH (in Euro) (Ministry of Agriculture, Water Management and Forestry of FBH, 2008–2012; Šume Republike Srpske" JSC 2008–2012)

	2008		2009		2010		2011		2012	
	FBiH	RS	FBiH	RS	FBiH	RS	FBiH	RS	FBiH	RS
	EURO									
Total Revenues	91 268 843	92 946 063	69 040 222	80 340 993	71 319 242	89 872 610	79 181 035	88 069 519	79 003 740	86 147 148
Revenues from wood sales	80 873 547	91 758 768	62 214 048	78 203 609	66 072 168	83 805 532	73 166 009	86 424 010	74 563 151	85 290 027
Other revenues *	10 395 296	1 187 294	6 826 174	2 137 384	5 247 074	6 067 077	6 015 026	1 645 509	4 440 589	857 121
Total costs	87 784 033	90 134 995	71 320 321	79 621 187	73 260 435	89 327 516	78 670 907	89 963 847	76 793 460	88 274 823
Gross profit/loss	3 484 810	2 811 067	-2 280 099	719 805	-1 941 193	545 094	510 128	-1 894 328	2 210 281	-2 127 675

to changes in interest rate, exchange rate differences etc. PE Šume Republike Srpske in their income statement describes following categories of other revenues: financial revenues, revenues from revaluation of assets and revenues arising from changes of accounting policy and correction of accounting errors from previous period. Therefore, it is difficult to understand exact share of other products and services (NWFP, hunting, mining, tourism activities etc.) in real revenues of companies.

5.2.4 Investment needs

Harvesting infrastructure is relatively poor in both entities with a high proportion of small scale harvesting contractors. There is a lack of investment in new machines and technology due to (a) limited access to finance, (b) lack of continuity of work and (c) low profit margins. The average road density of 9.4 m per ha (10.1 m per ha in FBiH and 9.05 m per ha in RS) is significantly below other European countries with broadly similar topography; e.g. Austria 36 m per ha and Switzerland 40 m per ha (World Bank, 2011). The low density and condition of the road network has consequences for harvesting and transport resulting in higher costs and can lead to environmental damage.

One of the major issues for future investment will be in human resources. If public sector forestry is to change and to deliver on its full potential, it will have to invest significantly in its human resources through the provision of additional skills in the areas of business and organizational development, operational change and change management, investment appraisal, cost benefit analysis, robust

Table 5.6: Gross domestic product by production approach 2000–2011 (Agency for Statistics of BiH, 2012), in 1 000 EUR

Statistical code 02	GDP in BiH [EUR]	Gross value added of forestry, logging and related service activities [EUR]	Gross value added of forestry, logging and related service activities [percent]
2000	6 043 267	82 768	1.37
2001	6 482 247	85 969	1.33
2002	7 149 081	95 351	1.33
2003	7 530 310	95 581	1.27
2004	8 179 723	90 778	1.11
2005	8 803 639	96 684	1.10
2006	9 970 072	110 709	1.11
2007	11 238 850	111 332	0.99
2008	12 730 005	127 800	1.00
2009	12 374 280	101 360	0.82
2010	12 666 121	105 277	0.83
2011	13 123 041	112 828	0.86

Source: Agency for Statistics of BiH, 2012

Table 5.6: Gross domestic product by production approach 2000–2011 (Agency for Statistics of BiH, 2012), in 1 000 EUR

Statistical code 02	GDP in BiH [EUR]	Gross value added of forestry, logging and related service activities [EUR]	Gross value added of forestry, logging and related service activities [percent]
2000	6 043 267	82 768	1.37
2001	6 482 247	85 969	1.33
2002	7 149 081	95 351	1.33
2003	7 530 310	95 581	1.27
2004	8 179 723	90 778	1.11
2005	8 803 639	96 684	1.10
2006	9 970 072	110 709	1.11
2007	11 238 850	111 332	0.99
2008	12 730 005	127 800	1.00
2009	12 374 280	101 360	0.82
2010	12 666 121	105 277	0.83
2011	13 123 041	112 828	0.86

Source: Agency for Statistics of BiH, 2012

budgeting processes, public awareness and communication.

More specific investment needs and priorities for action are outlined in section 11.

5.2.5 Contribution to GDP

The forest sector's contribution to GDP is shown in Table 5.6. While GVA for both segments is has been increasing compared to 2000, the overall share in GDP is decreasing. There was a considerable drop after 2008 due to the global economic crisis.

5.3 Sawmilling and manufacturing

According to data for 2011 from the Agency for Statistics of BiH (BHAS) and the Chamber of Commerce of BiH, the domestic Wood processing industry can be declared as one of the most important and competitive of the production sectors of the BiH economy. This is illustrated by the fact that it is one of only three sectors in BiH that reported a foreign trade surplus of more than BAM 418 million supported by double digit growth in production, sales and export performance, which has resulted in a rise in its share of GDP, manufacturing and the employment structure.

Moreover, in 2011 the WP industry saw 10.3 percent annually growth in terms of overall production volume that was almost double when compared to the dynamics of the whole of manufacturing at 5.6 percent annually. The rising production volume was fuelled primarily by a favourable external environment and rising foreign demand amongst the major trading partners (Euro-zone - primarily Germany). This resulted in a vigorous growth in export revenue of 14.7 percent annually

Table 5.7 Main performance indicators of the wood processing industry in 2011 (FIRMA 2012: BiH industry outlook Wood & Metal Processing Sectors, 2012)

2011						
	Sales (in million BAM)	**percent share**	**Exports (in million BAM)**	**percent share**	**Employment**	**percent share**
Sawmill products	461.6	6.6	277.1	3.3	-	-
Veneer	91.7	1.3	25.1	0.3	-	-
Joinery	48.1	0.7	48.6	0.6	-	-
Other wood products	56.9	0.8	15.4	0.2	-	-
Furniture	336.6	4.8	348.0	4.1	7 942	5.9
Prefabricated houses	6.5	0.1	29.2	0.3	-	-
Total WP	1 002.9	14.3	747.5	8.9	7 942	5.9
Total Manufacturing	7 015.1	100	8 430.4	100	133 707	100

up to BAM 747.5 million and amounted to 75 percent of the total wood processing revenue reported in 2011. With such a high and continued annual rise in its proportion of exports in terms of total production and sales the wood processing industry represents a substantial competitive advantage for further BiH economic development.

Dynamic wood processing attained an 8.9 percent share of the total export of goods and 14.3 percent of total manufacturing revenue in 2011 (compared to 8.8 percent and 13.8 percent respectively in 2010). Therefore, the share of the wood processing industry in 2011 in terms of GDP increased to 0.85 percent in 2011 from 0.75 percent in 2010. In addition, the structure of production, revenues and exports is becoming more favourable from year to year, with a higher proportion of production from segments with higher added value (Furniture and Seats, Wood Products and Prefabricated Houses).

5.3.1 Enterprise structure

In recent decades the industry has undergone a drastic change in structure and ownership. Before the war, more than 200 wood processing companies were operating. The wood industry represented about 10 percent of the total industrial production of BiH with exports estimated to be EUR 350 million annually (UNCTAD Advisory Services on Investment and Training, 2004). Two state owned holding companies (ŠIPAD and KRIVAJA) accounted for over 90 percent of the sector's production and dominated the market. After the war, the large state owned conglomerates disintegrated, were partially shut down, or sold off, giving space and business opportunities to privately owned companies. The government made efforts to privatize the sector with mixed results. Many new smaller sawmills were established, mainly intended for the local market, with no or little possibilities to generate export revenues or to be competitive. A considerable

Table 5.8: Wood processing industry in BiH 2005, number of units in operation (FIRMA, 2011)

Type of industry	Total number of wood industry facilities for BiH	
	Pre-war	Post-war
Sawmills, Veneer	61	1 500
Plywood/Composite	47	35
Pulp and paper	3	1
Joinery/Window, doors	30	183
Furniture	50	37
Other/Panels, specialties	31	23
Total of wood industries	222	1 700+

number of these new sawmills were established without control and license from the government. This is one of the reasons for the over-establishment of processing capacity.

According to the Assessment of the Sawlog Market (FIRMA, 2011) there are around 1500–1700 sawmills as compared to 61 before the war (Table 5.8). The majority of the bigger sawmills are from the 1970s and 1980s, with mostly obsolete technology worn out after 30–40 years of operation. The smaller sawmills are typically not able to produce high quality lumber for export, but are mainly for the local market. However, in spite of these problems the sector plays a significant role in the BiH economy due to employment and export earnings. The national consumption of wood products is small and the main focus must be on export of wood products, preferably with high added value. The main competitive advantage of BiH in the global market is low-cost labour, the good forest resources and the proximity to the EU market.

According to the mentioned assessment (FIRMA, 2011), a considerable share of sawmills – probably more than 50 percent – do not have state licenses for operation. Recent

Table 5.9: Employed persons in wood processing industry in 2010, 2011 and 2012 (Statistical Yearbooks of Republika Srpska 2011, 2012 and 2013; Statistical Yearbook of FBiH 2013)

	2010			2011			2012		
Division/Entity	**F BiH**	**RS**	**BiH**	**F BiH**	**RS**	**BiH**	**F BiH**	**RS**	**BiH**
Manufacture of wood and products of wood and cork	6 198	6 407	12 605	6 206	6 189	12 395	5 432	5 349	10 781
Manufacture of paper and paper products	1 517	767	2 284	1 521	707	2 228	1 577	637	2 214
Manufacture of furniture	4 846	3 000	7 846	4 609	2 972	7 581	3 657	2 596	6 253
Total	**12 561**	**10 174**	**22 735**	**12 336**	**9 868**	**22 204**	**10 666**	**8 582**	**19 248**

statistics (2010) from the FBiH Bureau of Statistics confirm the high number of sawmills. In FBiH there are 538 registered sawmills (with license) plus 41 other processing industries with sawmilling operations. According to the list of sawmills in RS that fulfilled technological requirements for work as well as plans for sawlog distribution in 2008, there were 447 sawmills in RS. There are no statistics on sawmills without licenses, but there could be up to 1 700 in total.

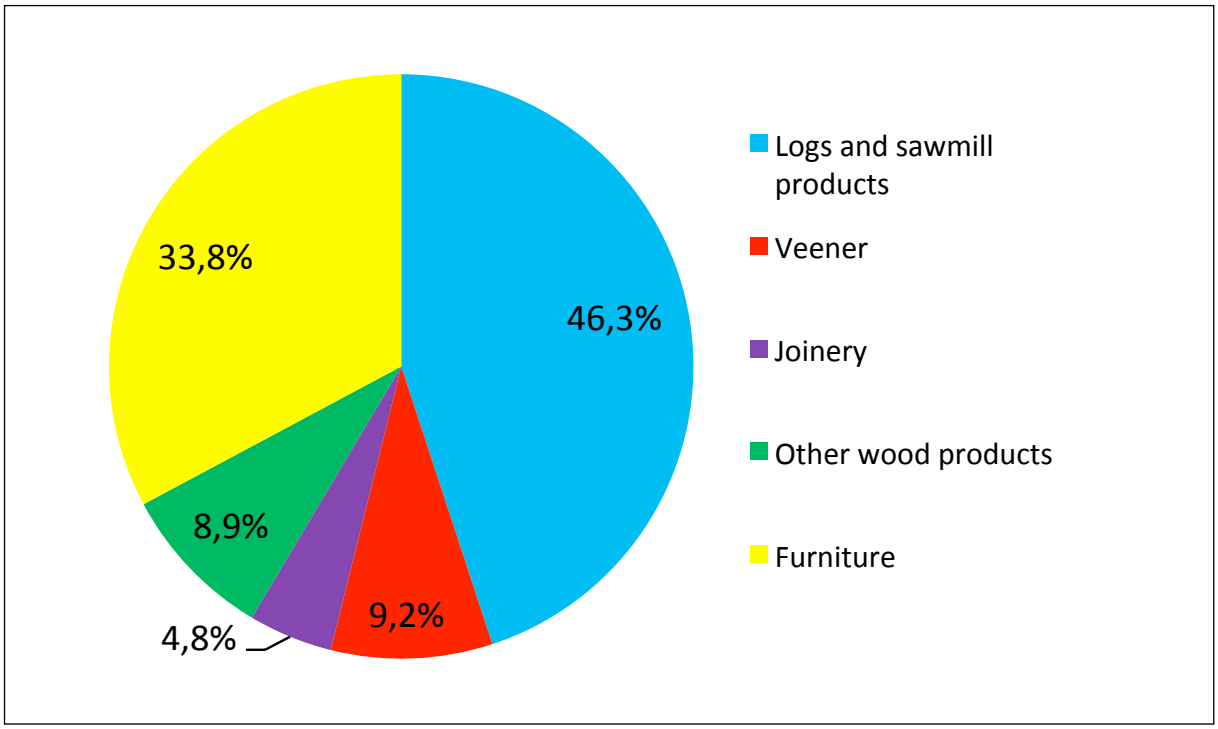
5.3.2 Employment

In reference to employment in the wood processing industry, the sector managed to post above average growth in employment compared to other segments of manufacturing and industry in general in 2011. With employment growth of 5.7 percent annually the WP industry employed 20 133 persons, out of whom 12 190 were engaged in wood and wood products production and 7 942 persons were employed in furniture production. In contrast, employment in manufacturing and in all other sectors of the BiH economy grew by only 2 percent on average. Therefore, in total the wood processing industry increased its share up to 15.1 percent of employment within manufacturing and 2.9 percent of total employment in the BiH economy.[17]

5.3.3 Revenues

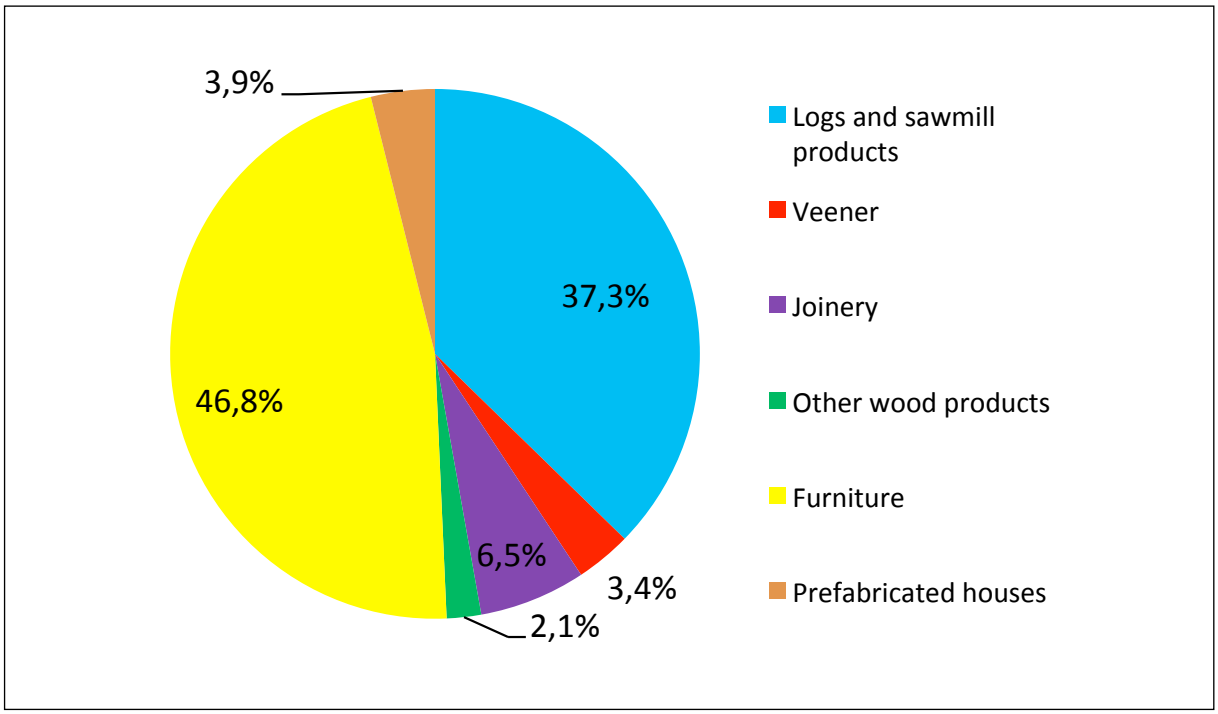
In terms of the dynamics of production and total revenue the fastest growing were segments of Sawmill Products with 9.5 percent annual growth and the Furniture segment that also reported solid growth of 5 percent annually.
As exports have been identified as the major underlying driver of the WP industry with a rising export/revenue share the fact that sub-segments with higher added-value (Furniture, Prefabricated Houses and Other Wood Products) improved the most in terms of export 2011, is especially encouraging.

Fig. 5.2: Structure of Revenues of Wood processing industry in 2011 (Chamber of Commerce of BiH)



17 Source: FIRMA 2012: BiH industry outlook 2012, Wood & Metal Processing Sectors

Fig. 5.3: Structure of export of Wood processing industry in 2011 (Chamber of Commerce of BiH)



Although the highest share of total exports of the WP industry is held by Furniture, with an impressive 46.8 percent (BAM 377 million), the Sawmill Products and Joinery sub-segments still reported the fastest double-digit growth rates (17.8 percent and 19.2 percent respectively) along with a rising share in the overall WP industry export structure in 2011, being the second and third largest sub-segments in terms of exports by the WP industry. Despite the trend of low value-added sub-segments increasing their share still not having been fully reversed the sub-segments of Furniture and Prefabricated Houses have reported some promising achievements and dynamics.

Moreover, the sub-segment of Prefabricated Houses reported impressive double-digit growth in exports by 15.3 percent in 2011 up to BAM 29.2 million or a four percent share of the WP industry, followed by Furniture with 11.3 percent growth and a 46.8 percent share corresponding to BAM 377.2 million.

The Furniture sub-section had the highest growth and share of exports through Mixed Furniture and their Parts, which reported 15.4 percent annual growth (BAM 174.7 million or a 23.4 percent share), followed by Seats and Chairs, which grew by 5.5 percent annually (BAM 129.6 million), and Mattress Frames with 12.1 percent annually equal to a 4.4 percent share or BAM 32.7 million of total WP exports.

Therefore, the export structure is becoming more favourable from year to year with a rising share of the production sub-segments with higher added-value and a more sophisticated production chain. As previously mentioned, the sub-sections with lower added value (sawmill products, Joinery and Veneering), which still comprised almost 50 percent of total exports, also reported double-digit growth rates in exports. However, it should be underlined that only joinery – with 19.2 percent – annually had an improved share of

total exports (from 6.2 percent to 6.5 percent BAM up to 48.6 million).

5.3.4 Capital structure and investment needs

In recent decades the industry has undergone a drastic change in structure and ownership. Before the war, more than 200 wood processing companies were operating. The wood industry represented about ten percent of BiH's total industrial production with exports estimated to be EUR 350 million annually (UNCTAD Advisory Services on Investment and Training, 2004). Two state owned holding companies (SIPAD and KRIVAJA) stood for over 90 percent of the sector's production and dominated the market.

After the war, the large state owned conglomerates disintegrated, were partially shut down or sold off, giving space and business opportunities to privately owned companies. The government made efforts to privatize the sector, with mixed results. Many new smaller sawmills were established, mainly intended for the local market, with no or little possibilities to generate export revenues or to be competitive. A considerable part of these new sawmills were established without control and license from the government. This is one of the reasons for the over-establishment of processing capacity.

There is a considerable gap between supply and demand, with supply estimated to be 2-3 times greater than demand, mainly due to the fact that the installed capacity of sawmilling is far too large. A considerable part of the industry is old and obsolete due to lack of maintenance, which means it is uncompetitive. There is also a lot of very small local sawmills. One qualified estimate indicates that only 20 percent of sawmills are competitive. Thus, it is very difficult to estimate the real competitive capacity which would equal real demand, other than stating that the competitive demand for sawlogs currently outstrips supply, that supply varies considerably from volume and quality, and finally and most importantly, that the supply limits the expansion of the wood industry. In general, the industry is not satisfied with the supply in terms of quality and quantity, or in terms of timing and confidence in deliveries.

There is potential for improving the performance of the wood processing industry in the following areas: composition of the industry structure, added value to products, increased operational efficiency, and decreased import of wood products, as well as increased marketing activities and in improved business relationship with the wood supplier. The present wood market has considerable potential for improvement; one example is to more effectively use sawlog auctions as a tool to analyse market changes and form prices.

Recommendations for improving the wood processing industry are to develop its composition, to continue to increase added value to its products, to increase net exports and improve business relationships with suppliers; namely the public forest enterprises. The increase of harvest volumes during the first decades will to a large degree consist of low-dimension wood not suitable for sawmilling. Possibly the biggest challenge for the industry and the forest sector is to develop the market and attract a processing industry for the low quality and low dimension wood.

In total, investments in joinery and solid wood furniture are projected to have the greatest

Table 5.10: Gross domestic product by production approach 2000–2011 (Agency for statistics of BiH, 2012), in EUR 1 000

GDP in BiH (1 000) EURO	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
	6 043 267	6 482 247	7 149 081	7 530 310	8 179 723	8 803 639	9 970 072	11 238 850	12 730 005	12 374 280	12 666 121	13 123 041
Gross value added of forestry, logging and related service activities [EUR]	82 768	85 969	95 351	95 581	90 778	96 684	110 709	111 332	127 800	101 360	105 277	112 828
Gross value added of forestry, logging and related service activities [%]	1.37%	1.33%	1.33%	1.27%	1.11%	1.10%	1.11%	0.99%	1.00%	0.82%	0.83%	0.86%
Gross value added of manufacturing of wood and products of wood and cork, except furniture [EUR]	77 348	67 674	64 424	63 117	72 774	74 102	83 193	102 367	110 667	89 071	92 507	92 545
Gross value added of manufacturing of wood and products of wood and cork, except furniture [%]	1.28%	1.04%	0.90%	0.84%	0.89%	0.84%	0.83%	0.91%	0.87%	0.72%	0.73%	0.71%
Gross value added of manufacture of pulp, paper and paper products [EUR]	4 227	5 991	5 832	8 899	8 560	9 380	11 228	11 877	12 890	18 067	27 780	33 523
Gross value added of manufacture of pulp, paper and paper products [%]	0.07%	0.09%	0.08%	0.12%	0.10%	0.11%	0.11%	0.11%	0.10%	0.15%	0.22%	0.26%
Gross value added of manufacturing of furniture, manufacturing n.e.c. [EUR]	45 966	45 449	40 928	50 314	48 516	47 626	51 620	60 044	65 266	60 691	62 301	61 620
Gross value added of manufacturing of furniture, manufacturing n.e.c. [%]	0.76%	0.70%	0.57%	0.67%	0.59%	0.54%	0.52%	0.53%	0.51%	0.49%	0.49%	0.47%

market potential and most promising outlook for investment (FIPA, 2006). Furthermore, as there is no particleboard industry in BiH, this is considered a promising field for business development, in particular for:

- Veneer / hardwood plywood
- Particleboard
- MDF

For the OSB industry, the lack of available softwood is a limiting factor (FIPA, 2006). This is due to softwood currently being underused in forest harvesting, but holds some opportunities when post-war succession stages of softwood in forests will be ready for harvesting in near future.

More specific investment needs and priorities for action are outlined in section 11.

5.3.5 Contribution to GDP

The contribution of sawmilling and manufacturing is shown in Table 5.10. While GVA for both segments is has been increasing compared to 2000, the overall ration compared to GDP is decreasing. There was a considerable drop after 2008 due to the global economic crisis.

5.3.6 Trade balance

The existing structure of the wood processing industry revenue and exports proves that all sub-segments of the wood processing industry are export-oriented, with the majority of their revenue collected on foreign markets. Furthermore, detailed analysis of the major export markets according to the sub-segments and different products shows that in almost all major sub-segments and group of products BiH have the same top five export markets. By grouping the markets and products it is clear that the major export market for the entire wood processing industry is Germany with a 26 percent share of total exports (BAM 216.8 million) followed by Croatia with 20 percent, Italy with 14 percent and Austria and Slovenia

Table 5.11. Growth of the wood processing industry in 2011 (FIRMA 2012: BiH industry outlook Wood & Metal Processing Sectors, 2012)

	Sales		Growth rate	Exports		Growth rate	Export/ Sales 2011	Structure of export 2011	Structure of sales 2011
in BAM mil	2010	2011	percent	2010	2011	percent		percent	percent
Sawmill products	421.6	461.6	9.5	235.3	277.1	17.8	60	37.1	46
Veneer	84.9	91.7	8	22.1	25.1	13.4	27.3	3.4	9.1
Joinery	44.2	48.1	8.9	40.8	48.6	19.2	-	6.5	4.8
Other wood products	53.2	56.9	10.3	11.9	15.4	29.2	26.2	2.1	5.8
Furniture	320.6	336.6	5	312.7	348	11.3	-	46.6	33.6
Prefabricated houses	6.1	6.5	7.1	25.3	29.2	15.3	-	3.9	-
Total WP	924.4	1 002.9	8.5	650.7	747.5	14.9	74.5	100	100
Manufacturing	6 681	7 015.1	5	7 293.8	8 430.4	15.6			

Table 5.12: Manufacture of paper and paper products (in tons) in FBiH for the period 2010–2012

	2010	2011	2012
Paper and cardboard	90 924	112 450	108 032
Corrugated paper and wrapping material	7 072	5 684	6 757

Source: Statistical Yearbook of FBiH 2013

Table 5.13: Manufacture of paper and paper products for household use in RS for the period 2010–2012

	Unit	2010	2011	2012
Manufacture of paper and paper products for household use	[t]	48 488	47 401	44 679

Source: Statistical Yearbooks of Republika Srpska 2011, 2012 and 2013

with 7 percent and 6 percent respectively.

Robust growth was reported in both sales and exports in 2011 with sales rising by 8.5 percent annually to BAM 1 002 900 000 while exports saw further double-digit growth by 14.9 percent annually to BAM 747.5 million. With 75 percent share of exports to total revenue in the wood processing industry, demand from the foreign markets is definitely the key determinant for the industry's outlook.

5.4 Pulp and paper

Before the war there was one pulp factory and two pulp and paper firms. In 2004 all but one were closed or destroyed during the war. Today, BiH's Natron Maglaj factory is producing kraft paper for sacks from both imported and locally supplied raw materials. The great reduction in demand for the small round wood that was used by these companies has caused problems. It reduced income for the forest companies, it removed the main market for smaller diameter trees cut in harvesting and thinning operations (which adversely effects long-term forest production), there is also a substantial volume of wood waste from sawmill operations and large quantities of small size coniferous wood. A part of this waste is used for briquette production. However, the value added is low, other solution is needed. The ideal alternative would be a big industry; e.g. pulp mill, particle board mill or a pellet industry. However, the present problems in wood supply constitute a bottleneck for foreign investment.

Natron-Hayat d.o.o. Maglaj is an esteemed European company that has a good reputation in the production of various types of paper and paper packaging. It was founded on 15 April 2005 by Natron d.d. Maglaj (company) and the reputable company Kastamonu Entegre, which is a member of the internationally renowned Hayat Holding Group from Turkey. This newly established company has inherited a 50-year-old tradition and experience in the paper industry (based on the successful work of the former Natron d.d. Maglaj). The damage suffered by

Natron d.d. Maglaj during the war between 1992 and 1995 was extensive, so after the Joint Venture company was founded it was necessary to start an investment program and revitalization process of the facilities that were once giving life to this company. Contracts have been signed with the world's leading manufacturers of pulp mill equipment, paper machines and waste water treatment systems: ANDRITZ AG (Austria), ANDRITZ OY (Finland), EXOR (Croatia), ENVIROTEK (Turkey), IED (Germany), GL&V (USA), TURBOTEH (Croatia), KADANT Johnson (Italy), A. CELLI PAPER S.p.a. (Italy). Natron-Hayat produces 100 percent cellulose virgin based brown kraft paper. Annual production of brown kraft paper is 85 000 tonnes.

Natron-Hayat produces the following products: Standard Kraft Paper, Semi Extensible Sack Kraft Paper, Packaging paper, MG (machine glazed) paper, crepe paper, finishing paper, paper sacks, paper bags, corrugated board and board packaging, cores. With its current production, Natron-Hayat meets not only the domestic market needs but also demand from outside the borders of Bosnia and Herzegovina.

For pulp and paper production, there are two big domestic companies: "Violeta" Ltd. located in Grude (FBiH) and SHP Celex a.d. located in Banja Luka (RS).

"Violeta" Ltd. is a regional leader in the production of paper-based hygienic products and it has its own production facilities in BiH. At the moment the Violeta group employs about 700 workers and has 13 branch offices in BiH and Croatia. The factory of hygienic products in Grude is equipped with the latest technology and contains several production lines for the production of wide range of products. in addition to toilet paper and tissues, for the portfolio was enlarged by wet wipes production. "Violeta" is the national market leader in the production and sales of wet wipes, kitchen towels, toilet paper, tissues and napkins.

The paper factory SHP Celex a.d. Banja Luka has been founded in 1966 as one of the most modern factories at that time in former Yugoslavia. It was privatized in 2001 by the Eco-Invest company from Slovakia and became a member of the SHP Group, the biggest paper group in South-eastern Europe. SHP Group is a member of Eco-Invest, and invested over 24 million EUR in SHP Celex up to now. Particular attention was given to the modernization of technology for production of cellulose paper and paper-based products.

Table 5.14: Employed persons in manufacture of paper and paper products in 2010, 2011 and 2012 (Statistical Yearbook of Republika Srpska 2011, 2012 and 2013; Statistical Yearbook of FBiH 2013)

Division/Entity	2010			2011			2012		
	FBiH	RS	BiH	FBiH	RS	BiH	FBiH	RS	BiH
Manufacture of paper and paper products	1 517	767	2 284	1 521	707	2 228	1 577	637	2 214

Table 5.15: Gross domestic product by production approach 2000 - 2011 (Agency for statistics of BiH, 2012), in EUR 1 000

	GDP in B-H [EURO]	Gross value added of manufacture of pulp, paper and paper products [EUR]	Gross value added of manufacture of pulp, paper and paper products [percent]
2000	**6 043 267**	4 227	0.07
2001	**6 482 247**	5 991	0.09
2002	**7 149 081**	5 832	0.08
2003	**7 530 310**	8 899	0.12
2004	**8 179 723**	8 560	0.10
2005	**8 803 639**	9 380	0.11
2006	**9 970 072**	11 228	0.11
2007	**11 238 850**	11 877	0.11
2008	**12 730 005**	12 890	0.10
2009	**12 374 280**	18 067	0.15
2010	**12 666 121**	27 780	0.22
2011	**13 123 041**	33 523	0.26

Final products include toilet paper, kitchen towels, pocket tissues and napkins, under the company brand Harmony. The company employs about 350 workers and it is one of largest paper producers and processors in BiH with a capacity of approximately 35 000 tonnes per year. SHP Celex a.d. Banja Luka exports about 80 percent of its total production to more than 20 countries worldwide.

5.4.2 Employment

Around 2 214 people were reported to have been employed in the pulp and paper industries in 2012, of which Natron-Hayat currently employs more than 840 workers.

5.4.3 Contribution to GDP

The contribution of pulp and paper is shown in Table 5.15. Both segments show a significant increase compared to 2000.

5.5 Fibre industries

Before the war there were four chipboard companies in BiH and one medium-density fibreboard (MDF) company. In 2004 all but one were closed or destroyed during the war (FIRMA, 2011).

Table 5.16: Installed capacities of wood processing industry in BiH in 1991 (FIRMA, 2011)

Product	Quantity	Unit
Sawn wood of conifers and broadleaves	2 000 000	m^3
Veneer panels	70 000	m^3
Panel plates	37 000	m^3
Fibreboards	47 000	m^3
Plywood	223 000	m^3
Medium density fibreboard	89 000	m^3
Veneer	90 000	m^3
Millwork and builders carpentry (doors windows)	1 650 000	piece
Parquet panels	1 450 000	m^2
Flooring	500 000	m^2
Prefabricated houses	250 000	m^2
Wooden packaging	300 000	m^3
Set of furniture	50 000	set
Other furniture	5 700 000	piece
Matches	200 000	piece
Products from plaiting (brushwood)	1 500 000	piece
Cork	350	tons
Products from cork	600	m^3

5.6 Bioenergy

Many countries in the world have large forested areas which, if managed in a sustainable way, can yield large quantities of raw materials for production of heat or electrical energy. The term “bioenergy” refers to all types of energy obtained from biofuel or fuel obtained from biological materials; i.e. biomass (FAO, 2004). Bioenergy offers the possibility to reduce greenhouse gas emissions per produced energy unit, reducing energy import dependence and at the same time a means to respond to increasing fossil fuel prices for the energy supply of the population. Depending on the level of institutional and legislative development of the state, biomass production offers possibilities for promotion of sustainable management of natural resources, advancement of rural development and opening of new jobs. BiH belongs to a group of countries which have a large percentage of territory covered by forest resources, which indicates a certain potential for energy production based on sustainable use of forest biomass.

5.6.1 The potentials of woody biomass in BiH

Strategic documents of both FBiH and RS indicate that biomass from forests as well as wood residuals from wood-processing industry represent significant potential for energy production. The Strategic plan and program for development of energy sector in the FBiH (2008) states that currently in BiH just a few larger wood processing companies have biomass cogeneration facilities for energy production which are more or less out of work. Furthermore, currently there are no strategic plans in the energy sector for the construction of biomass facilities for electrical energy production. On the other side, the contribution of biomass (mainly from wood and wood residuals) to the final energy consumption is 9 percent at the level of BiH (Trenner et al., 2006). The firewood is extremely important in the rural areas and smaller municipalities where the central heating systems are not installed yet. In those areas more the 60 percent of households are using firewood for heating (Arnautović et al., 2013). The important issue addressed by many authors and organization is related to the assessment of woody biomass potentials in BiH. Recent assessments of woody biomass potentials in BiH based on the current level of forestry production, both from state and privately owned forests, showed that woody biomass for energy production currently available in BiH is equal to 2.3 million tonnes per year (Table 5.17).

Production levels in the forest sector depend on a series of market and institutional factors. In order to improve the production process and enable a more effective use of forest resource potentials additional funds

Table 5.17: Available quantities of wood biomass for energy production (UNDP, 2014)

Sources	Conifers m^3	Deciduous trees m^3	Total m^3
Cordwood for energy	1 711	1 228 441	1 230 152
Residues after cutting and production of wood products	342 181	261 154	603 335
Small branches	314 848	401 432	716 280
Residues and waste after production of sawn timber, veneer and furniture	354 857	200 843	555 700
Stumps	314 848	334 527	649 375
Total [m^3/year]:	1 328 446	2 426 396	3 754 842
Total [t/year]:	557 947	1 747 005	2 304 952
Total [tce]	298 866	840 422	1 139 288
Total [toe]	209 223	588 343	797 567

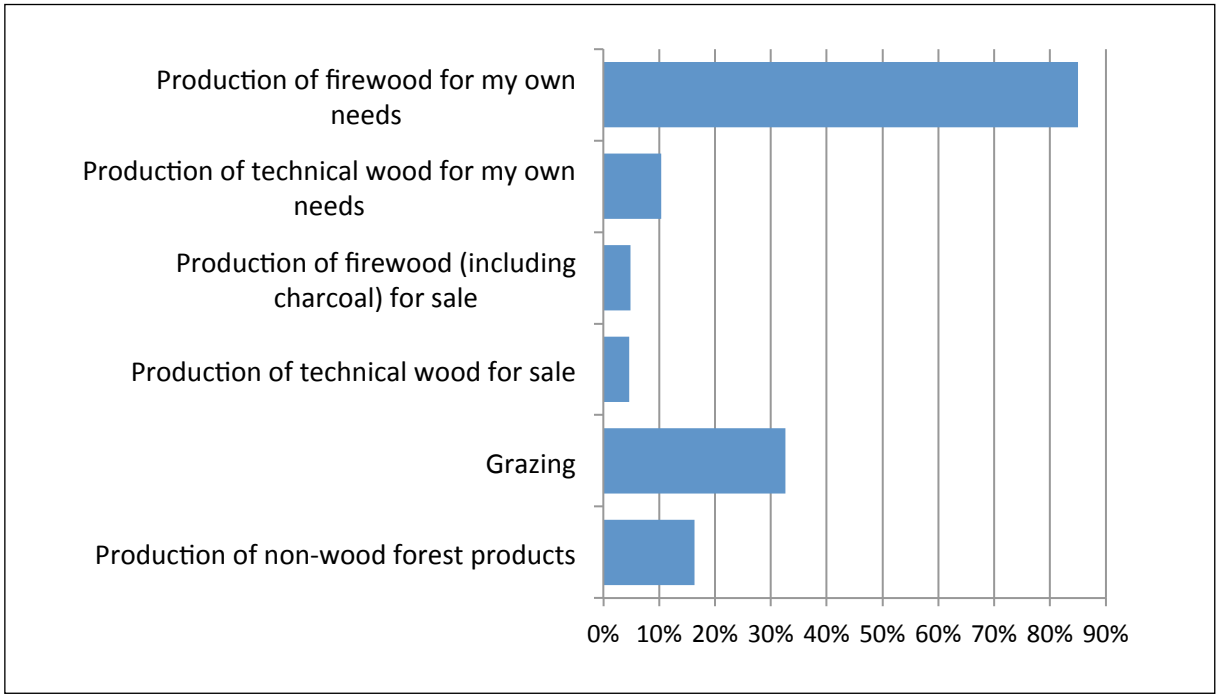
Source: UNDP (2014): Possibilities of using biomass from forestry and wood industry in Bosnia and Herzegovina (draft version of the study)

should be invested into the accompanying infrastructure, primarily into the opening of the forest complexes. Currently, the forest sector in BiH is not able to earmark sufficient funds from its current activities for additional investment to the construction of the primary forest road infrastructure. All this indicates a need to find additional (external) funding sources with the aim of fully realizing the planned allowable cut. Realizing the planned cutting scope would mean a quantitative increase of the supply of forest wood products in the market.

When analysing institutional capacities for sustainable use of forest biomass, it is important not to neglect the capacities of private forest owners for the production of forest biomass, more so as an analysis of the quality of forest eco-systems in BiH showed that privately owned forests are of a lower quality and are thus very suitable for the production of forest biomass for the needs of energy production. In order to obtain data on the readiness of private forest owners to produce forest biomass, a research project entitled "Opportunities for Wood Energy Production from Small Scale Forests in the SEE Region (WESSPROFOR)" was realized as part of the project "Consolidation of Human Capacities in Forest Policy and Economics Education and Research in the South East European Region" – FOPER II, EFI). The research includes, among other things, forest owners in BiH. The results of the research conducted in BiH show that the majority (73 percent) of respondents recognize the benefits to be obtained by the production of woody biomass. In the majority of cases, the respondents believed that the production of wood biomass from privately owned forests can contribute to their better use and ensuring economic benefit for the owner.

When it comes to ways of using privately owned forests, 85 percent of the respondents use their forests for provision of firewood for their own needs (Graph 1). Then, 32.6 percent of the respondents use their forests

Fig. 5.4: Purpose of use from private forests (WESSPRFOR, 2010)



for grazing and 16.3 percent for production on non-wood products. These results, with the indicated characteristics of private forest holdings, show that it is only by association of private forest owners in BiH that a sustainable and market-oriented use of forest biomass from private forests can be achieved.

It is important to note that the Law on the Use of Renewable Energy Sources and Efficient Cogeneration (FBiH) and the Law on Renewable Energy Sources and Cogeneration (RS) regulate the incentives for production of electrical and heat energy from renewable energy sources and efficient cogeneration and creation of conditions for the establishment/ development of a market for produced electrical energy. On the basis of such a legislative solution, private forest owners' associations could apply for appropriate financial assistance to responsible entity institutions for joint production of forest biomass and joint mobilization of unused potentials of privately owned forests.

5.6.2 Enterprise structure

The mains suppliers of woody biomass in BiH are the public companies that manage state owned forests. These companies produce the cordwood for energy that is then sold to the local population for domestic purposes or privately owned companies for further distribution on the market. Some private wood processing companies, besides their regular production, have installed capacities for pellet or briquette production. Depending on the area of BiH, the number and structure of companies oriented toward this kind of production varies because the domestic market for pellets and briquettes is still relatively undeveloped. This means that most of the produced quantities are exported to international markets (mainly EU). According to the UNDP study: "Cost/benefit analysis in the biomass sector of BiH", current pellet production capacities are 100 000 tonnes per year and increasing due to the relatively high demand from external markets.

5.6.3 Trade balance

For the purpose of this study, in terms of trade balance, we focus on two broader types of wood energy products with custom code 4401 – Fuel wood, in logs, in billets, in twigs, in faggots or in similar forms; wood in chips or particles; sawdust and wood waste and scrap, whether or not agglomerated in logs, briquettes, pellets or similar forms and 4402 – charcoal.

Table 5.20.: Export and import of fuel wood
(Agency for statistic BiH)

	Export	Import
	BAM	
2008	55 871 912.38	186 674.03
2009	75 723 585.05	292 505.35
2010	80 268 120.74	418 639.33
2011	100 208 869.20	463 842.06
2012	102 135 838.08	1 048 095.02
2013	152 308 583.61	498 882.04

Fig. 5.6: Trends of export and import of fuel wood (Agency for statistic BiH)

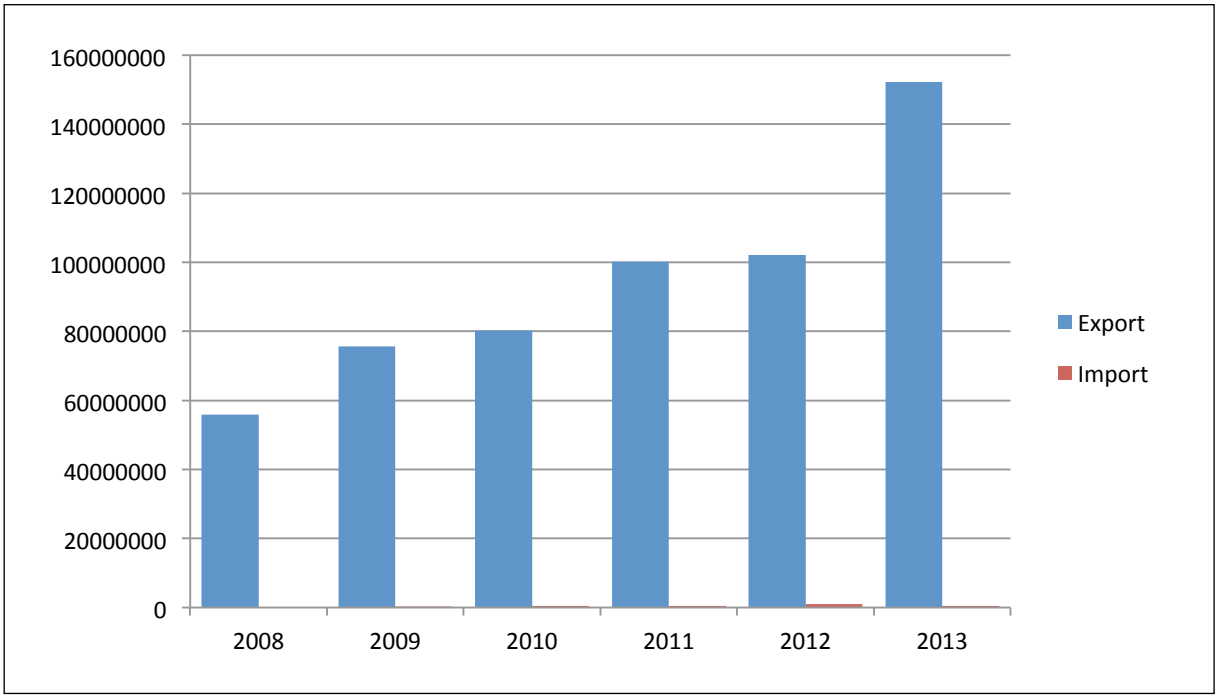


Table 5.21: Main export markets for fuel wood from BiH ***(Agency for statistic BiH)***

	ITALY	SLOVENIA	AUSTRIA	GERMANY	CROATIA	SERBIA	Total	percent from total export
	BAM							%
2008	27 740 964	16 120 367	4 714 744	2 158 566	3 950 476	130 011	54 815 128	98
2009	37 450 428	17 853 805	10 414 431	4 682 952	3 666 180	200 130	74 267 926	98
2010	34 522 060	21 352 735	10 050 601	6 027 070	4 275 221	363 560	76 591 246	95
2011	37 214 138	25 204 558	14 256 924	11 105 039	4 688 973	317 182	92 786 814	93
2012	40 893 379	23 582 638	11 297 727	10 886 161	5 125 122	1 258 214	93 043 241	91
2013	67 053 575	37 904 334	12 583 356	14 109 445	7 337 615	793 102	139 781 428	92
Total:	244 874 544	142 018 436	63 317 784	48 969 234	29 043 585	3 062 198	531 285 781	

The chemical industry JSC “Destilacija” Teslić is one of the biggest individual producers of charcoal in BiH. The company was established in 1896 as the very first enterprise for chemical wood processing by dry distillation in the Balkan region. The availability of wood resources and suitable geographical locations in the central part of BiH were prevailing

reasons for initiating this kind of production. Since the completion of the privatization process, the company has been organized as a Joint Stock Company (JSC). With investments in modern equipment the production process was significantly improved in terms of technical efficiency as well as compliance to environmental standards. The company sells its products on domestic and international markets. The main commercial products of JSC "Destilacija" Teslić are charcoal, charcoal briquettes, acetic acid and vinegar. Annual charcoal production is 14 000 tonnes while annual production of charcoal briquettes amounts to approximately 6 600 tonnes. In addition there are numerous small-scale producers of charcoal.

5.6.4 Investment needs

The formation of an industrial biomass sector is among the most promising fields for investments. In the light of enhanced biomass demand in the EU (due to Bioenergy strategy, Biomass Action Plan), entering this field of business could safeguard a higher domestic value generation as compared to lower value products such firewood and charcoal.

In the focus of interest for future investment are particularly wood pellet production and biomass- based heat production (also in integrated form in wood-based industry (FIPA, 2006). More specific investment needs and priorities for action are outlined in section 11.

5.7 Summary

The European Economic and Social Committee identified common challenges affecting the economic development of rural areas in the Western Balkans: the development of entrepreneurship is limited by factors such as underdeveloped infrastructure; a lack of skilled labour; limited access to markets and to finance; a lack of investment support and low entrepreneurial potential; rural development policies in the region, which should assist the diversification of the rural economies, are still inadequate and not in line with the EU rural development policy; civil society does not play an important role in rural areas, due to a lack of entrepreneurial and organizational skills. This holds true for all Western Balkan countries, though at different stages.

According to Glavonjic et al (2008) Primary wood processing, sawnwood and wood-based panels, and furniture production are important to most countries in the western Balkan region, with Croatia and BiH being the strongest ones. These two countries are also strongest in exports for sawnwood, wood-based panels, and furniture. It is a common phenomenon in the Western Balkans that value-adding through downstream processing is low, and sawnwood and semi-processed parts dominate exports.

For BiH the main issues are:

- The level of complexity in forest management organization does not support an adaptive forest management in rural areas, a general conservatism among forest management administration is line with this observation;
- Private forest owners manage around 20 percent of the forests in BiH. They represent a major target group for any rural development activities, but widely lack knowledge and skills, capacities, financial pouvoir, organization, and motivation to manage their forests;
- The income structure of public forest enterprises is not ambitious, partly due to demands of "social" services to combat

rural poverty (e.g. wood use rights). A higher profitability of public forestry could create additional assets for RD;

- Forest infrastructure (i.e. forest roads) and harvesting technology are insufficient to grant efficient forestry operations;
- Sawmilling capacities show over-capacities and outdated technology. Technological innovation and coordinated production clusters are needed to increase efficiency in the sawmill operations;
- The traditional business of high quality furniture (especially solid wood) in small and medium-sized enterprises is a big asset of the wood-sector in BiH;
- In the absence of board industry in BiH, there is a promising field for business development, in particular for veneer / hardwood plywood, particleboard, MDF.
- The formation of an industrial biomass sector is seen among the most promising fields for investments. In the light of enhanced biomass demand in the EU (due to Bioenergy strategy, Biomass Action Plan), entering this field of business could safeguard a higher domestic value generation as compared to lower value products such firewood and charcoal;
- In the focus of interest for future investment are particularly wood pellet production and biomass- based heat production (also in integrated form in wood-based industry). This also comprises a more efficient and profitable usage of the low-dimension wood and saw-mill residues.

6. Forest-based products, services and value chains

6.1 Wood availability and balances

By comparing total annual volume increment and average annual felling, one can conclude that total volume of annual felling represent only 46 percent of the total annual volume increment. Since average annual felling is less than total annual volume increment, it can be assumed that growing stock is increasing. Yet, most of the annual felling is realized in high forests with greater and more valuable growing stock. Furthermore, these categories of forests have greater density of forest roads.

A comparison of the data on total annual volume increment and average annual felling revealed that volume of annual felling in public high forests (4 416 000 m^3) represent 59 percent of its total annual volume increment (7 481 000 m^3). In case of private-owned high forests, this percentage is even smaller (around 36 percent). When it comes to coppice forests, volume of annual felling in public coppice forests represents 34 percent of total annual volume increment while in private-owned coppice forests, total annual felling represents 50 percent of total annual volume increment.

Figure 6.1 shows that wood production in BiH has been more or less constant in the last few years, but significantly below 5 million m^3 per year. It also shows that the amount of hardwood exceed wood from conifers.

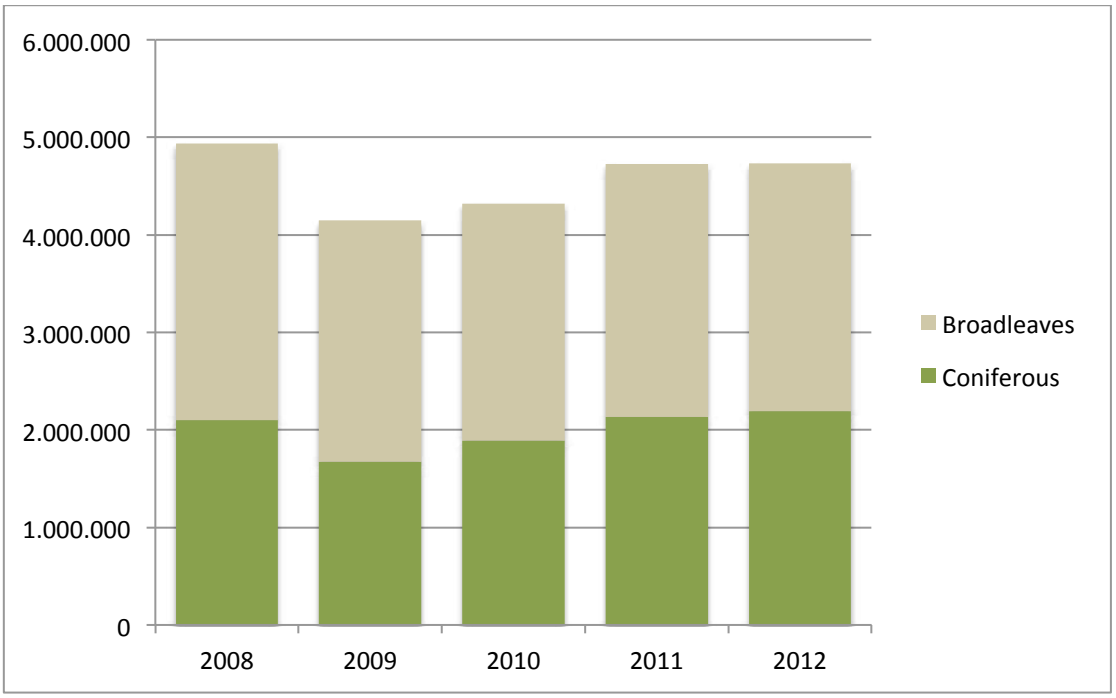
Tables 6.2 and 6.3 further indicate the ratios of wood production in FBiH and RS. Wood

Table 6.1: Growing stock, total annual volume increment and volume of realized felling per ownership categories in BiH (USAID, 2012)

Forest types	Public owned		Private owned			Total in B-H
	1 000 m^3	m^3 per ha	1 000 m^3	m^3 per ha	1 000 m^3	m^3 per ha
Growing stock						
High forests	299 630	282	53 968	202	-	266
Coppice forests	35 710	87	46 412	107	-	97
Total	335 340	228	100 380	143	-	201
Total annual volume increment						
High forests	7 481	7.03	1 622	6.1	9 087	6.83
Coppice forests	907	2.22	1 192	2.75	2 095	2.48
Total	8 348	5.67	2 814	4.09	11 182	5.16
Average annual felling*						
High forests	4 416	4.15	446	1.68	4 819	3.62
Coppice forests	307	0.75	598	1.38	899	1.07
Total	4 723	3.21	1 044	1.5	5 718	2.63

*Average felling in the last 10 year

Fig. 6.1 Wood production in BiH 2008-2012 (FBiH Ministry of Agriculture, Water Management and Forestry, 2013, and Annual Forest Bulletin for 2013)



production in RS is significantly higher than in the FBiH though inferior in forest area. This may refer to higher efficiency in reaching towards the annual allowable cut of one centralised public enterprise as compared to several cantonal enterprises.

Table 6.2: Share of coniferous and deciduous assortments in the production for the period 2008–2012 (in m³) - FBiH *(FBiH ministry of agriculture, water management and forestry, 2013)*

	2008	2009	2010	2011	2012
Coniferous	946 525	722 403	862 128	935 160	926 859
Broadleaves	1 046 845	886 151	907 829	956 935	950 315
Total	**1 999 370**	**1 608 554**	**1 769 957**	**1 892 095**	**1 877 174**

Table 6.3: Share of coniferous and deciduous assortments in production for the period 2008–2012 (in m³) Republika Srpska *(Annual Forest Bulletin for 2013)*

	2008	2009	2010	2011	2012
Coniferous	1 155 874	948 515	1 027 660	1 197 512	1 268 691
Broadleaves	1 787 013	1 594 703	1 522 681	1 640 223	1 584 677
Total	**2 942 887**	**2 543 218**	**2 550 341**	**2 837 735**	**2 853 368**

Table 6.4 gives a summary overview of production and sales in BiH. It can be shown that both production and sales indicate no positive growth trend.

Table 6.4: Production and sales of wood assortments in BiH (2008-2013) (in m³)

(RS Institute of Statistics, 2013; FBiH Ministry of Economy, Water Management and Forestry, 2013)

	2008		2009		2010		2011		2012		2013	
	Production	Sales	Production	Sales	Production	Sales	Production	Sales	Production	Sales	Produc-tion	Sales
TOTAL	**4 010 888**	**3 978 272**	**3 429 025**	**3 349 530**	**3 614 899**	**3 643 044**	**3 500 351**	**3 487 564**	**3 796 369**	**3 736 063**	**4 024 171**	**3 831 311**
Coniferous	**1 722 003**	**1 707 770**	**1 395 745**	**1 351 496**	**1 577 825**	**1 604 798**	**1 580 277**	**1 593 306**	**1 763 822**	**1 729 217**	**1 944 451**	**1 795 007**
Logs	1 308 068	1 300 443	1 028 723	969 497	1 060 401	1 072 789	1 047 823	1 056 016	1 176 542	1 154 227	1 256 218	1 147 353
Mining wood	108 615	98 008	83 812	61 389	102 254	106 249	118 818	123 398	122 860	125 431	136 472	128 152
Other long coniferous wood	116 007	108 539	76 717	86 583	83 013	82 383	92 945	93 080	74 783	69 598	14 396	12 422
Cord coniferous wood	181 540	192 361	204 261	230 664	330 437	340 607	318 806	318 779	388 066	377 864	536 315	505 963
Coniferous firewood	7 773	8 419	2 232	3 363	1 720	2 770	1 885	2 033	1 571	2 097	1 050	1 117
Broadleaf	**2 288 885**	**2 270 502**	**2 033 280**	**1 998 034**	**2 037 074**	**2 038 246**	**1 920 074**	**1 894 258**	**2 032 547**	**2 006 846**	**2 079 720**	**2 036 304**
Logs	733 200	733 543	568 364	581 511	597 570	614 885	567 670	581 589	613 353	626 115	643 300	646 164
Mining wood	6 368	6 735	6 954	6 963	7 140	6 402	5 879	5 584	4 886	5 163	3 666	3 668
Other long broadleaf wood	13 170	12 785	13 100	12 559	16 355	15 630	13 599	15 097	17 344	16 977	15 941	14 277
Cord broadleaf wood	103 485	106 494	117 591	105 083	157 552	163 602	127 066	131 677	130 651	128 005	82 008	81 046
Broadleaf firewood	1 432 371	1 410 654	1 326 714	1 290 913	1 257 769	1 236 757	1 205 142	1 159 383	1 266 259	1 230 257	1 334 378	1 290 532
Other roughly processed wood	291	291	557	1 005	688	970	718	928	54	329	427	617

6.1.4 Demand for private wood

When it comes to firewood demand from private households, there is no official data, although there are some estimations.

According to the preliminary results of the census (Source: Agency for Statistics of BiH, 2013: Preliminary results of 2013 census of population, households and dwellings in BiH), the population of BiH is 3 791 622. The total number of households amounts 1 163 387 which gives an average number of members per household (3.26).

Applying the OECD definition of rural areas (based on population density), 81 percent of the total area of BiH and 61 percent of the population can be classified as rural. Out of 142 municipalities in BiH, 114 (with population of 2 372 162) are classified as rural ones (Source: EU SESMARD, 2007: BiH Strategic Plan for Harmonization of Agriculture, Food and Rural Development). The majority of them (at least 600 000 households) use firewood (in extensive manner, not in a form of briquette or pellets) as main source of energy for heating, with only few expectations that use coal, oil or electricity, as alternatives for individual energy production and consumption. According to UNDP, at least 60 percent of population in eastern Bosnia use firewood in their households (Source: GEF-UNDP, 2011. The Analysis of Wood Residuals Potentials in BiH – focus on municipalities Srebrenica, Bratunac and Milići).

The minimum annual average need per household can be estimated on 6 m^3 (in central and mountain regions, the minimum annual need for heating and cooking is 12 m^3 per household). Very simple calculation (600 000 households times 6 m^3) gives total private wood demand of at least 3.5 million m^3 annually.

At the same time, the official sources (RS Institute of Statistics and FBiH Ministry of Economy, Water management and Forestry) report significantly smaller quantities of produced firewood (see Chapter 6.1. Table: Production and sales of wood assortments in BiH, 2008–2013). In 2013, the total production of firewood in both entities was only 1 335 428 m^3. Naturally, certain demands of local population are satisfied by residuals from saw-milling (particularly the rest of beech logs production) but the difference between estimated demand by private households and official data on actual production of firewood is still huge. It may be explained in the following manners:

- Official sources presenting production amount of firewood are not reliable or;
- The data on firewood from private forests (used mainly for domestic use) are not recorded properly or;
- There are some illegal logging activities in BiH forestry.

After discussions with stakeholders in both entities, it appears that the missing data on firewood use (unrecorded or illegal use of firewood on private land, particularly abandoned one) is the main reason for this discrepancy. This, on the other hand, also gives a strong indication of the potential exploitation of private forest land to close the gap between fire wood demand and supply. In the FBiH, private forest owners have to pay land use tax to the cantonal public forest administration before any harvesting operations in their forests. The tax amounts to 10 percent of the value of

marked trees. The officials of the public forest administration perform the marking of trees for felling, measurement and labelling of timber, and they issue the documentation for transport and selling logs (waybill) to private forest owners. As a compensation for paying the tax, private forest owners receive services related to planning of silvicultural activities, guarding and forest protection as well as other professional tasks in terms of management of private forests from cantonal public forest administration. Besides, forest management plans for private forests are financed from the cantonal funds for enhancement of forests by Cantonal Ministries responsible for forestry.

As a consequence to this administrational set-up the avoidance of tax payments may be the main underlying reason for missing and unrecorded data in the use of private forests.

6.2 Forest-based value chains - Trade and marketing

6.2.1 Wood products trade patterns

This section presents the sales, export and import of several types of wooden products. The original data was provided by Agency for Statistics of Bosnia and Herzegovina. The results are based on following the Common Customs Tariff (according to the EU Combined Nomenclature – CN).

Table 6.5 gives an overview about wood products produced and sold 2012 in BiH (Agency for statistics of BiH, 2013)

Product code	Name of goods or services	Units of measure	Amount produced	Sold/delivered quantity		Value of sales/charges for delivery (000 KM)	
16	Manufacture of wood and wood products						
16.1	Sawmilling and planning of wood; impregnation of wood						
16.10.	Sawmilling and planning of wood; impregnation of wood						
16.10.10.	**Wood, sawn or chipped lengthwise, of a thickness >6mm; railway of tramway sleepers (cross-ties), not impregnated**			**TOTAL**	**952 360**	**TOTAL**	**253 234**
16101010	Railway or tramway sleepers (cross-ties) of wood, not impregnated	m^3	908	922		1 784	
16101033	Coniferous wood; sawn or chipped lengthwise, sliced or peeled, of a thickness > 6 mm, end-jointed, sanded or planed	m^3	55 287	47 737		15 854	
16101035	Spruce wood (Picea abies Karst.), fir wood (Abies alba Mill.)	m^3	474 960	436 459		113 262	
16101037	Pine wood (Pinus sylvestris L.)	m^3	1 321	1 221		437	
16101039	Softwood sawn/chipped lengthwise, sliced/peeled and thickness > 6 mm including pencil slats - wood length <= 125cm, thickness <12.5 mm excluding end-jointed - planed/sanded, spruce/pine	m^3	6 652	7 005		2 003	
16101050	Wood, sawn or chipped lengthwise, sliced or peeled, of a thickness > 6mm (excluding coniferous and tropical woods and oak blocks, strips and friezes)	m^3	305 320	195 942		114 501	
16101071	Tropical wood, sawn or chipped lengthwise, sliced or peeled, end-jointed or planed/sanded, of a thickness > 6mm	m^3	788	788		1 986	
16101077	Oak blocks, strips or friezes for parquet or wood block flooring, planed but not assembled (excluding continuously shaped)	m^2	315 474	262 286		3 407	
16.10.21	**Wood continuously shaped (including strips and friezes for parquet flooring, not assembled)**			**TOTAL**	**3 422 116**	**TOTAL**	**4 121**
16102110	Coniferous wood continuously shaped (including strips and friezes for parquet flooring, not assembled)	kg	2 371 721	2 381 503		3 484	

16102150	Non-coniferous wood continuously shaped (including strips and friezes for parquet flooring, not assembled)	kg	1 752 522		1 040 613		637
16.10.22	**Wood wool, wood flour**			**TOTAL**	**2 516 250**	**TOTAL**	**579**
16102200	Wood wool, wood flour	kg	2 516 450		2 516 250		579
16.10.23.	**Wood chips or particles**			**TOTAL**	**12 132 895**	**TOTAL**	**1 643**
16102303	Coniferous wood in chips or particles	kg	5 702 277		3 807 485		202
16102305	Non-coniferous wood in chips or particles	kg	9 153 050		8 325 410		1 441
16.10.31	**Rough poles, impregnated with paint, stains, creosote or other preservatives**			**TOTAL**	**6 888**	**TOTAL**	**3 287**
16103116	Rough softwood poles, injected or otherwise impregnated with paint, stains, creosote or other preservatives	m^3	8 745		6 888		3 287
16.10.32	**Railway or tramway sleepers (cross-ties) of impregnated wood**			**TOTAL**	**1285**	**TOTAL**	**1 091**
16103200	Railway or tramway sleepers (cross-ties) of impregnated wood	m^3	1 808		1 285		1 091
16.10.39	**Other wood in the rough, including split poles and pickets**			**TOTAL**	**3 883**	**TOTAL**	**589**
16103900	Other wood in the rough, including split poles and pickets	m^3	4 383		3 883		589
16.10.91	**Drying, impregnation and chemical treatment of wood**			**TOTAL**	**6 677**	**TOTAL**	**739**
16109100	Treatment; impregnation and preservation of wood (including seasoning and drying)	m^3	6 577		6 677		739
16,2	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards						
16,21	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards						
16.21.11	**Plywood, veneered panels and similar laminated wood, of bamboo**			**TOTAL**	**2 172**	**TOTAL**	**2 417**
16211100	Plywood, veneered panels and similar laminated wood, of bamboo	m^3	2 269		2 172		2 417
16.21.12	**Other plywood, veneered panels and similar laminated wood**			**TOTAL**	**12 931**	**TOTAL**	**17 768**

16211214	Plywood consisting solely of sheets of wood (excluding of bamboo), each ply not exceeding 6 mm thickness, with at least one outer ply of non-coniferous wood (excluding tropical wood)	m^3	1 629		1 395		2 197
16211221	Veneered panels and similar laminated wood with blockboard, laminboard or battenboard	m^3	11 515		11 536		15 571
16.21.13	**Particle board, of wood**			**TOTAL**	**6 335**	**TOTAL**	**1 762**
16211313	Particle board, of wood	m^3	6 335		6 335		1 762
16.21.21	**Veneer sheets, sheets for plywood and other wood sawn lengthwise, sliced/ peeled, thickness <=6mm**			**TOTAL**	**12 010**	**TOTAL**	**11 897**
16212113	Veneer sheets, sheets for plywood and other wood sawn lengthwise, sliced/ peeled, thickness <=6mm and end-jointed, planed/sanded/small boards for the manufacture of pencils	m^3	12 390		12 010		11 897
16.21.22	**Densified wood, in blocks, plates, strips or profile shapes**			**TOTAL**	**25 375**	**TOTAL**	**37 163**
16212200	Densified wood, in blocks, plates, strips or profile shapes	m^3	27 161		25 375		37 163
16,22	Manufacture of assembled parquets						
16.22.10	**Assembled parquets**			**TOTAL**	**861 921**	**TOTAL**	**16 937**
16221030	Parquet panels of wood for mosaic floors	m^2	43 048		39 781		437
16221060	Parquet panels of wood (excluding those for mosaic floors)	m^2	832 011		822 140		16 500
16,23	Manufacture of other builders' carpentry and joinery						
16.23.11	**Windows, French-windows and their frames, doors and their frames and thresholds**			**TOTAL**	**399 964**	**TOTAL**	**32 442**
16231110	Windows, French-windows and their frames, of wood	per piece	26 959		27 046		9 018
16231150	Doors and their frames and thresholds, of wood	per piece	368 705		372 918		23 424
16.23.12	**Shuttering for concrete constructional work, shingles and shakes, of wood**			**TOTAL**	**596 719**	**TOTAL**	**718**
16231200	Shuttering for concrete constructional work, shingles and shakes, of wood	kg	645 906		596 719		718
16.23.19				**TOTAL**	**207 931**	**TOTAL**	**7 240**

16231900	Builders' joinery and carpentry of wood (excluding windows, French-windows and doors, their frames and thresholds, parquet panels, shuttering for concrete constructional work, shingles and shakes)	kg	194 856		195 895		426
16232000	Prefabricated buildings of wood	m^2	12 036		12 036		6 814
16,24	Manufacture of packaging of wood						
16.24.11	**Pallets, box pallets and load boards of wood**			**TOTAL**	**1 062 769**	**TOTAL**	**8 294**
16241133	Flat pallets and pallet collars of wood	per piece	978 653		986 251		7 855
16241135	Box pallets and load boards of wood (excluding flat pallets)	per piece	77 014		76 518		439
16.24.13	**Other packaging of wood and their parts**			**TOTAL**	**337 684**	**TOTAL**	**228**
16241320	Cases, boxes, crates, drums and similar packing of wood (excluding cable drums)	kg	354 735		337 684		228
16,29	Production of other products of wood, cork, straw and plaiting materials						
16.29.11	**Tools, body and most of the tools, body and held for brooms and brushes, blocks for the manufacture of smoking pipes, moulds for shoes and boots made of wood**			**TOTAL**	**260 000**	**TOTAL**	**405**
16291130	Tools, tool bodies and handles and broom or brush bodies and handles of wood; boat and shoe lasts and trees of wood	kg	243 000		260 000		405
16.29.14	**Wooden frames for paintings, photographs, mirrors or similar objects of wood**			**TOTAL**	**307 981**	**TOTAL**	**4 102**
16291420	Wooden frames for paintings, photographs, mirrors or similar objects	m	97 205		97 205		599
16291490	Other articles of wood (excluding pallet collars)	per piece	209 950		210 776		3 503
16.29.25	**Manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork**			**TOTAL**	**336 500**	**TOTAL**	**2 217**
16292500	Manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork	kg	334 550		336 500		2 217
31	Furniture production						
31.0	Furniture production						
31.00	Chairs and their parts; parts of furniture						

31.00.12	**Seats, mostly with wooden frames**			**TOTAL**	**1 488 829**	**TOTAL**	**94 714**
31.00.12.10	Seats convertible into beds (excluding garden seats or camping equipment)	per piece	95 771		96 835		30 900
31.00.12.50	Upholstered seats with wooden frames (including three piece suites) (excluding swivel seats)	per piece	1 147 990		1 121 147		55 038
31.00.12.90	Non-upholstered seats with wooden frames (excluding swivel seats)	per piece	278 363		270 847		8 776
31.00.20	**Other seats - data presented refers to wooden furniture only (i.e. category 31.00.20.50 only). Totals are including quantity of sold furniture and their value (000 KM) for all types of wooden and non-wooden products in this category.**			**TOTAL**	**1 505 744**	**TOTAL**	**15 380**
31.00.20.50	Parts of wooden furniture excluding for medical, surgical, dental or veterinary furniture, seats - for specially designed furniture for hi-fi systems, videos or televisions	m^3	6 387		6 350		8 062
31,01	Manufacture of office and shop furniture						
31.01.12	**Wooden office furniture**			**TOTAL**	**6 942**	**TOTAL**	**2 546**
31.01.12.00	Wooden furniture of a kind used in offices	per piece	6 943		6 942		2 546
31.01.13	**Wooden furniture for shops**			**TOTAL**	**17 026**	**TOTAL**	**996**
31.01.13.00	Wooden furniture for shops	per piece	17 030		17 026		996
31,02	**Kitchen furniture**			**TOTAL**	**292 960**	**TOTAL**	**45 919**
31.02.10	Kitchen furniture	per piece	294 011		292 960		45 919
31.09.12	**Wooden bedroom furniture, wooden furniture for the dining-room and living-room**			**TOTAL**	**801 175**	**TOTAL**	**93 224**
31,09.12.30	Wooden bedroom furniture (excluding builders' fittings for cupboards to be built into walls, mattress supports, lamps and lighting fittings, floor standing mirrors, seats)	per piece	187 443		187 680		41 477
31.09.12.50	Wooden furniture for the dining-room and living-room (excluding floor standing mirrors, seats)	per piece	585 410		613 495		51 747
31.09.13	**Wooden furniture not elsewhere classified**			**TOTAL**	**663 074**	**TOTAL**	**27 549**
31.09.13.00	Other wooden furniture (excluding bedroom, dining-, living-room, kitchen office, shop, medical, surgical, dental/veterinary furniture, cases and cabinets designed for hi-fi, videos and televisions)	per piece	663 401		663 074		27 549

It shows that the production and sales of sawnwood (some BAM 253 million) is by far the most important product category in BiH, with some certain significance for wood manufacture and furniture.

In total, BiH is a net exporter of wood products and provides a trade balance surplus to the country. Fig. 6.2 shows the development of export and import of wood products.

The figures show an increasing export trend while import of wood products in 2013 was still lower than in 2008.

Looking more specifically to the main markets for both exports and imports, tables 6.6 and 6.7 show that the main export markets for BiH are Italy, Slovenia and Germany, in terms of import these are Croatia, Austria and Serbia. By more closely examining import/export

Fig. 6.2: Export and import of wood products in the period 2008–2013 in BAM (Agency for Statistics of BiH, 2013)

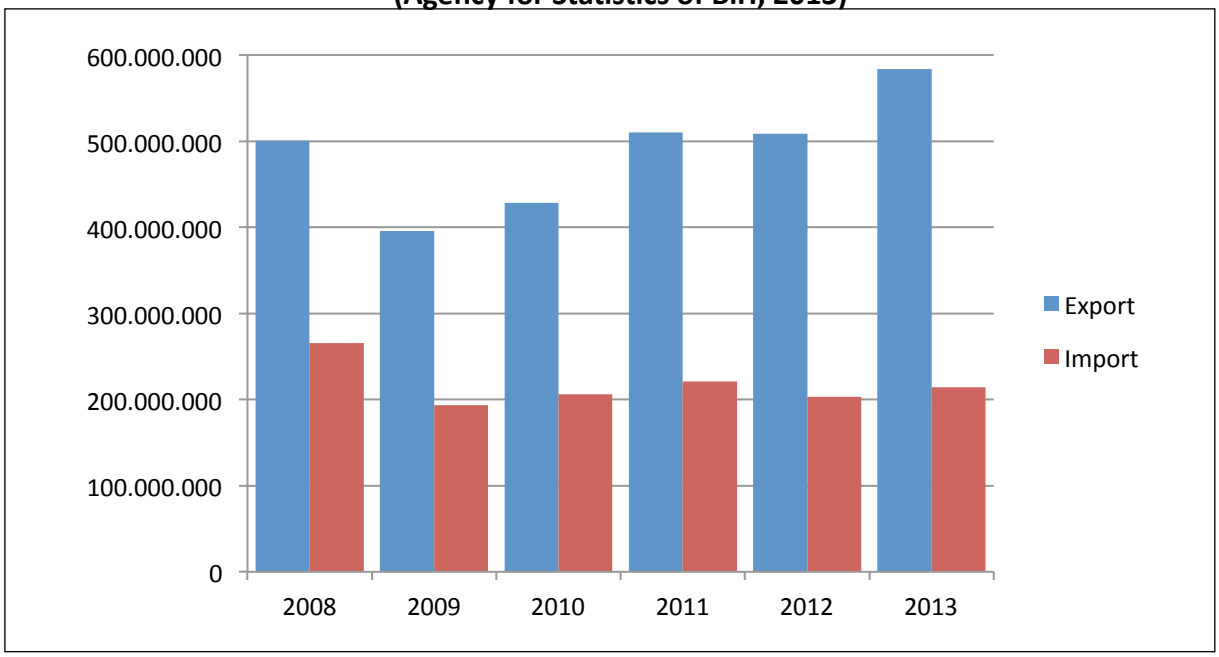


Table 6.6: The main export markets for wood products from BiH (Agency for Statistics of BiH, 2013)

Year	ITALY	SERBIA	CROATIA	GERMANY	SLOVENIA	AUSTRIA	TOTAL	percent from total export
	1 000 BAM							%
2008	73 698	112 774	90 650	42 079	52 601	34 516	406 319	81
2009	66 603	71 372	63 646	49 101	39 726	28 226	318 675	81
2010	75 782	65 072	63 313	57 877	43 225	31 278	336 548	79
2011	88 167	65 629	67 324	71 783	60 763	46 187	399 852	78
2012	101 113	58 573	62 737	77 406	49 030	43 941	392 799	77
2013	110 949	57 756	62 987	75 671	81 024	44 938	433 326	74
Total	**516 312**	**431 176**	**410 657**	**373 918**	**326 369**	**229 086**	**2 287 519**	-

Table 6.7: The main import markets for wood products from BiH (Agency for Statistics of BiH, 2013)

Year	CROATIA	AUSTRIA	SLOVENIA	SERBIA	GERMANY	ITALY	TOTAL	percent from total import
	1 000 BAM							%
2008	47 944	29 363	36 946	22 570	20 549	11 670	169 042	64
2009	33 471	21 675	22 480	17 791	20 244	9 972	125 632	65
2010	37 035	22 705	24 231	17 186	16 804	8 255	126 216	61
2011	38 637	25 075	21 837	20 226	18 769	8 852	133 397	60
2012	38 987	26 988	20 645	23 063	16 632	8 515	134 830	66
2013	41 471	30 454	19 070	25 807	14 668	9 042	140 512	66
Total	**237 545**	**156 260**	**145 210**	**126 643**	**107 665**	**56 306**	**829 629**	-

segments of wood products, it can be shown (following UNECE, 2012, Table 6.8) that BiH is:

- A net exporter of sawnwood (softwood and hardwood)
- A net importer of Particle board and fibre board
- A net exporter of pulpwood, but net importer of wood pulp
- Veneer sheets, hardwood logs, paper & paperboard are rather balanced

Table 6.8: Timber Committee Forecasts 2011-2013 (UNECE, 2012)

	Apparent consumption			Production			Import			Export		
	2011	2012	2013	2011	2012	2013	2011	2012	2013	2011	2012	2013
Sawn softwood	34	44	45	560	640	642	5	4	3	532	600	600
Sawn hard-wood	340	355	360	548	550	560	50	55	60	258	250	260
Veneer sheets	8	8	9	13	13	15	4	4	4	9	9	10
Plywood	11	12	13	11	13	14	10	11	13	10	12	14
Particle Board	124	132	135	11	17	19	113	116	117	1	1	1
Fibre Board	61	66	79	1	3	4	60	63	75	0		0
Wood Pulp	114	130	150	79	95	100	35	35	50	0	0	0
Paper & Paper-board	124	150	160	146	178	190	77	77	80	99	105	110
Softwood logs	1 126	1 250	1 290	1 149	1 265	1 300	13	15	20	36	30	30
Hardwood logs	644	650	656	634	641	650	16	15	12	6	6	6
Pulpwood	617	638	679	914	939	1030	87	88	94	384	389	445

6.2.2 Marketed and non-marketed non-wood forest products

According to some studies (Gatarić 1988 in USAID, 2010), BiH has over 700 species of medicinal and aromatic plants (MAPs) out of which 200 are utilized. This list includes several endangered species that are amongst the most collected and traded ones (*Gentiana lutea, Arnica montana, Arctostaphyllos uva ursi and Orchis spp.)* (USAID, 2010). Both during the Yugoslav period and today, BiH mainly provides raw material of medicinal and aromatic plants (Donnelly et al., 2002 in USAID, 2010). It is almost impossible to find reliable data on quantities of traded or exported plant material that originates from BiH (USAID, 2010).

Still, according to the data from Foreign Trade Chamber and USAID, the export structure of the sector of non-wood forest products (NWFP) is dominated by mushrooms and forest fruits with almost 75 percent. Also, significant item in the structure of exports are essential oils that recorded growth of 88 percent in 2012 compared to the earlier year.[18]

Table 6.9: Export of the NWFPs for period 2010-2012 (in BAM)

	2010	2011	2012	Index 2012/2011
Mushrooms (fresh, frozen, dried, canned)	15 640 856	10 770 311	13 327 893	1.24
Forest fruits (cranberry and blueberry; fresh and frozen)	4 511 109	5 005 153	818 979	0.16
Medicinal and aromatic plants	4 898 945	4 969 569	4 699 526	0.95
Essential oils	1 162 144	1 312 767	2 322 094	1.77
Honey	64 549	62 780	16 580	0.26
Total	**26 277 602**	**22 120 580**	**21 185 072**	**0.96**

Source: Foreign Trade Chamber of Bosnia and Herzegovina – Association for agriculture and food processing industry (Group for production, collection and processing of medicinal herbs and forest fruits)

18 Source: http://ekapija.ba/en/Vijest/news/the-sector-of-herbs-and-forest-fruits-BiH-expects-a-70-growth-in-export/32704

According to data from the Foreign Trade Chamber for the year 2012, the sector for production, collection and processing of NWFPs had recorded surplus in the export of their products.

Table 6.10: Export of the NWFPs for 2010–2011 per products in quantities (kg) and value (BAM)

		Export 2010		Export 2011		
Code of the tariff	**Product**	**Quantity (in kg)**	**Value (in BAM)**	**Quantity (in kg)**	**Value (in BAM)**	**Index (2011/2010)**
709510000	Agaricus, fresh	39 692	435 247	6 345	110 361	16
709559100	Chanterelles, fresh	150 628	1 201 432	152 976	1 785 406	102
709559900	Other mushrooms, fresh	479 669	4 856 041	46 908	796 192	10
710806100	Agaricus, frozen	26 673	272 638	5 597	57 417	21
710806900	Other mushrooms, frozen	352 415	3 318 956	212 231	1 958 676	60
711510000	Agaricus, canned	17 807	371 157	25 226	250 380	142
711590000	Other mushrooms, canned	68 641	641 088	84 935	736 385	124
712310000	Agaricus, dried	3 361	144 129	586	22 734	17
712390000	Other mushrooms, dried	125 495	4 400 166	112 772	5 052 758	90
810403000	Blueberries, fresh	42 890	270 968	92 831	573 491	216
810401000	Cranberries, fresh	0	0	4 701	22 699	
811905000	Blueberries, frozen	1 116 136	4 240 141	696 253	4 408 961	62
902	Tea, flavoured/non-flavoured	8 268	170 634	1 842	56 429	22
903	Mate tea	80	2 425	0	0	0
909	Anise, badian, fennel	132 773	270 943	399 506	958 782	301
910	Ginger, saffron, bay	4 908	73 678	2 500	21 533	51
1211	Herbs, parts of herbs	820 095	4 381 264	627 464	3 932 823	77
40900000	Organic honey	8 121	64 548	5 997	62 780	74
3301	Essential oils	8 915	1 162 144	16 238	1 312 767	182
	TOTAL	**3 406 573**	**26 277 602**	**2 494 911**	**22 120 580**	**73**

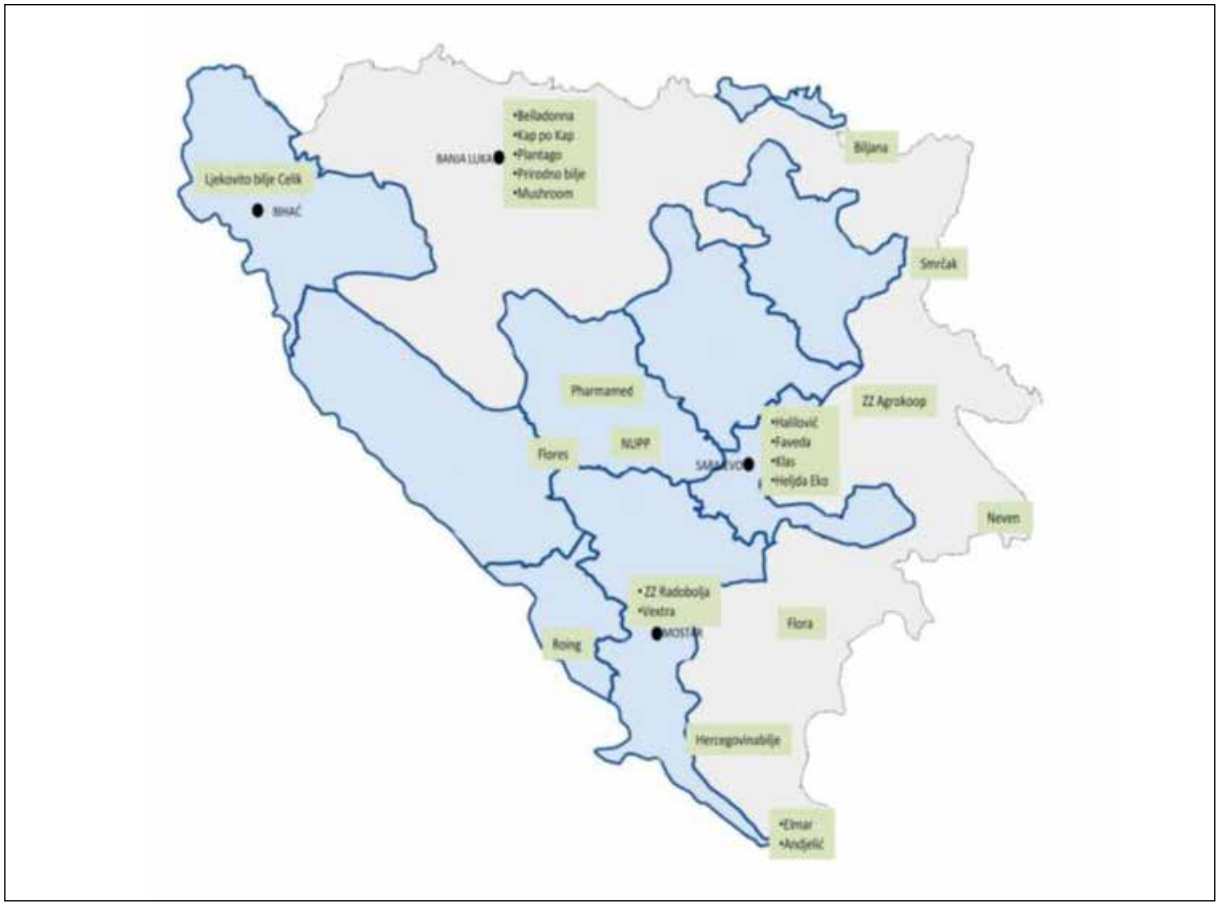
Source: Foreign Trade Chamber of Bosnia and Herzegovina – Association for agriculture and food processing industry (Group for production, collection and processing of medicinal herbs and forest fruits)

Table 6.11: Import of the NWFPs for 2010-2011 per products in quantities (kg) and value (BAM)[19]

		Import 2010		Import 2011		
Code of the tariff	**Product**	**Quantity (in kg)**	**Value (in BAM)**	**Quantity (in kg)**	**Value (in BAM)**	**Index (2011/2010)**
709510000	Agaricus, fresh	6 845	46 473	4 469	13 144	65
709559100	Chanterelles, fresh	6 260	13 467	23	532	0
709559900	Other mushrooms, fresh	2 019	9 882	0	0	0
710806100	Agaricus, frozen	473	1 532	0	0	0
710806900	Other mushrooms, frozen	14 884	62 595	28 836	144 252	194
711510000	Agaricus, canned	319	934	0	0	0
711590000	Other mushrooms, canned	22	1 858	0	0	0
712310000	Agaricus, dried	108	1 129	0	0	0
712390000	Other mushrooms, dried	28 570	438 469	15 649	707 072	55
810403000	Blueberries, fresh	92	1 926	246	5 449	267
810401000	Cranberries, fresh	0	0	907	6 709	0
811905000	Blueberries, frozen	3 193	19 366	35 136	236 769	1100
902	Tea, flavoured/ non-flavoured	58 030	843 906	40 730	750 643	70
903	Mate tea	617	6 228	3	174	0
909	Anise, badian, fennel	18 248	76 709	27 555	113 386	151
910	Ginger, saffron, bay	90 409	965 604	753 354	836 006	833
40900000	Organic honey	275 990	2 267 648	256 483	2 142 071	93
3301	Essential oils	15 147	287 931	16 453	346 560	109
1211	Herbs, parts of herbs	339 798	4 437 988	384 732	4 866 202	113
	TOTAL	**861 029**	**9 437 180**	**1 564 578**	**10 168 976**	**182**

19 Source: Foreign Trade Chamber of Bosnia and Herzegovina – Association for agriculture and food processing industry (Group for production, collection and processing of medicinal herbs and forest fruits)

Fig 6.3: Map of major small and medium MAPs enterprises as regards NWFP in BiH (USAID –FIRMA, 2010)



According to the USAID (2013), there are about 50 small and medium-sized enterprises operating in the sector of herbs and forest fruits. Many of these companies sell wild berries, wild mushrooms and other non-wood forest products.

According to estimations, around 100 000 people collect various types of non-wood forest products within companies registered for their collection and further processing. For instance, in RS, concessions to collect NWFP are given to private companies, which also supports tax collection, customs operations and certification implementation (FSC).The following list represents the most frequently collected and traded species of wild medicinal and aromatic plants in BiH. These are as follows (Source: USAID – FIRMA, 2010):

- Thyme (*Thymus serpyllum*)
- Melissa (*Melissa officinalis*)
- Rose hip (*Rosa canina*)
- Wild garlic (*Alium ursinum*)
- Ivy (*Hedera helix*)
- Horse chestnut (*Aesculus hippocastanum*)
- Mistletoe (*Viscum album*)
- Iceland moss (*Cetraria islandica*)
- Cowslip (*Primula veris*)
- Sage (*Salvia officinalis*)
- St. John's Wort (*Hypericum perforatum*)
- Juniper (*Juniperus communis*)
- Nettle – (*Urtica dioica*)
- Yarrow – (*Achillea millefolium*)
- Gentian (*Gentiana lutea*)
- Linden (*Tilia sp.*)

- Catnip (*Nepeta cataria*)
- Dancelion (*Taraxacum officinale*)
- Iris (*Iris germanica*)
- Rosemary (*Rosmarinus officinalis*)
- Immortele (*Helichrysum italicum*)
- Bearberry (*Arctostaphylos uva-ursi*)
- Elder (*Sambucus nigra*)

The most frequently collected/traded wild berries in BiH are as follows:

- Bilberry (*Vaccinium myrtillus*)
- Cowberry (*Vaccinium vitis-idaea*)
- Strawberry (*Fragaria vesca*)
- Raspberry (*Rubus idaeus*)

The most frequently collected/traded wild mushrooms in BiH are as follows:

- Boletus (*Boletus edulis*)
- Chanterelle (*Cantharellus cibarius*)
- Royal agarics (*Craterellus cornucopoides*)
- Morel (*Morchella conica*)
- Caesars mushroom (*Amanita caesarea*)

According to the data derived from the Final Report of EU (Analysis and Mapping of Value Chain) MAP annual harvesting in BiH varies from 1 500 to 9 000 tonnes (depending on demand and climatic conditions), mostly dried plants packed and sold in 25 kg sacks as raw material (FIRMA, 2013).

Larger qualities are predominantly produced for export. However, previous analysis revealed the current usage of certain non-wood forest products in the sector of herbs and forest fruits in BiH. However, it used a rather narrow definition of NWFP, which shows room for development of the NWFP sector (e.g. decorative material, game). The definition of non-wood forest products given in the Article 8 of the Law on Forests of Republika Srpska (Official Gazette of RS, No. 30/10) is used as an illustration of the variety of non-wood forest products and their under-utilization in BiH:

"non-wood forest products include:
1) products of plants origin: medicinal, edible, aromatic and industrial forest plants, fruit and seeds, forest litter, peat, resin, reed, phloem, cones, horticultural shrubs, mushrooms, tree-juices, various parts of plants (root, bark, leafs, fruits etc.) which can be used in leather industry (tannin) for woodland pastures, grass (hay) from meadows
2) products of animal origin: bees and their products, snails, leeches, worms, game, snakes (poison, skin, meat) and inorganic nature products such as humus

Forest legislation also prescribes legal obligations related to the usage of NWFPs. According to the Article 6 of the Law on Amendments to the Law on Forests (Official gazette of the RS, No. 60/13) Article 29 of the Law on Forests of RS (Official gazette of the RS, No. 30/10) is amended as follows:

Article 29
(1) Public forest enterprise is responsible for the Plan for NWFPs utilization.
(2) The Plan for NWFPs utilization should contain the following information: location, overall reserves, type, quantity, period and methodology for collection of NWFPs, market price of the products as well as the type of silvicultural activities that should be undertaken for restoration of locations where NWFPs had been collected.
(3) Terms for use of NWFPs in forests owned by the RS are prescribed by the Minister.

According to the Article 12 of the Law on Amendments to the Law on Forests (Official gazette of the RS, No. 60/13) Article 77 of the Law on Forests of RS (Official gazette of the

RS, No. 30/10) is amended as follows:
"(1) NWFPs are used in accordance with directions from Forest management plan and Plan for usage of NWFPs as well as regulations which refer to this activity.
(2) The user of forests and forest lands which are owned by the RS has the right to use NWFPs for 3 percent of the selling price. This compensation has to be paid onto a special account owned by RS and is intended for revitalization of NWFPs at the location where they have been collected.
(3) For forest management units where the user of forests and forest lands owned by the RS are not using NWFPs public, tender should be announced.
(4) Legal bodies and entrepreneurs (commercial collectors) have to pay 5 percent from selling price for collecting the NWFPs.
Again, this compensation is intended for the revitalization of NWFPs at the location where they have been collected.
(6) The Minister prescribes the Terms for usage and collection of NWFPs."
In case of the FBiH, the Regulation on Forests is no longer in force since 6 December 2011 following the Decision of the Constitutional Court of FBiH. The forestry at the level of the FBiH is currently legally unregulated The nine cantons have adopted their own respective laws on forests setting different forest management and governance frameworks, the issue of ownership as well as funding allocations for forest use, protection and improvement.

6.2.3 Associations and sectoral clusters

Associations and cooperatives are an important feature of business creation and development. The forest-based sector is a sector where both horizontal (e.g. among private forest owners) and vertical cooperation (along different segments of the value chain) is essential, especially for generating business opportunities for private land owners and entrepreneurs (e.g. Weiss et al., 2012a). Associations can help overcome marginal quantities of products, secure certainty of supply, increase the efficiency of operations, and generally strengthen the market position of members.

Although there are some promising examples from countries in transition where forest associations helped to mobilise and organize private forest owners (c.f. Weiss et al., 2012b), they are still widely lacking in BiH. The FBiH Law on Forests from 2002 (which is not valid since 2009) prescribed that cantonal forest offices shall provide financial and professional support for the establishment and functioning of different forms of forest owners associations where the reduced size of forest parcels, the fragmentation, or dispersal of parcels of different owners are barriers to sustainable and efficient forest management. However, there is no evidence that such support was actually happening in BiH.

The Association of private forest owners "Naša Šuma" can be seen as an exception. It was established in 2006 in municipality of Čelinac (Republika Srpska) with the mission to become a common voice of all private forest owners in B-H for gaining their rights and implementation of legislative obligations related to forest management. The association's vision is to assure equal status of private forest with public forests and to become a leader in organizing private forest owners in BiH, to participate in the adoption of legislative framework and to become member of CEPF. Any natural or legal persons in BiH that have forests or forest land can be a

member of this association. Enrolment in the association is facilitated its regional branches. Currently, this association has regional branches across entire RS as well as in Canton 10 of the FBiH. The association has its expert bodies, different commissions and Council for forest management. In 2010, this association published the Guide for private forest owners in Republika Srpska that is consisting out of most important economic, social, ecological and legislative information about organization of forest management practice in RS[20].

Prevailing problems in forming such forest associations lie particularly in (Avdibegovic et al., 2011):

- The large number of individual private forest owners
- The individual private forest owners have quite different interests that prevent them from getting organized.
- Private forest owners have too little knowledge about the functioning of associations.
- Private forest owners' interest associations have no tradition in the forest sector of BiH.
- There are negative experiences with similar associations (cooperatives in agriculture) during the previous Socialism period.

Although Avdibegovic et al (2011) found a high interest in the formation of associations by private forest owners, major steps need to be taken in institutional and financial support as well as capacity measures.
There are a number of manufacturing clusters in the broader forest-based sector in BiH:

- Wood Cluster Association Bosnia and Herzegovina (WC-BiH) is a private sector group promoting networking and joint activities in research and information dissemination, collaborative operations, and joint marketing. It emerged throughout the USAID Cluster Competitiveness Activity in particularly the Wood Processing and Forestry Cluster (WP&F Cluster).
- Wood and Furniture Cluster DRVO Prijedor (DRVO Prijedor) was established in 2005 by local companies with support from the Agency for Economic Development of the Municipality Prijedor (PREDA) in order to provide a platform for business cooperation, education, exchange of information, and development of SMEs of the wood and furniture industry sector. Currently, it comprises 11 wood processing companies. The aim is to promote the regional wood and the furniture industry and improve the business environment and economic development of this sector.
- Wood and Furniture Cluster DRVO Banja Luka (DRVO Banja Luka) was established in 2005 by local companies with the support of the City Development Agency (CIDEA) in order to provide a platform for business cooperation, education, exchange of information, and development of small and medium-sized enterprises (SMEs) of the wood and furniture industry sector. Currently, it comprises 12 wood processing companies. The aim is to promote the regional wood and furniture industry and improve the business environment and economic development of this sector.
- Forestry and wood technology organization in Bosnia and Herzegovina (INTERFOB BiH) was founded in Banja Luka (Bosnia and Herzegovina) in July 2006. It is a non-profit, non-governmental development and consulting organization. Its activities involve project engineering,

20 Source: http://www.nasasuma.com/

trainings /educational and consulting services in the field of wood technology, forestry, environmental protection, agriculture, light industry, energy efficiency and waste management. The mission of INTERFOB is to stimulate development of the wood industry, forestry and environmental protection, and to promote new technologies, exchange of information and to promote placement and competitiveness of SMEs.

- ARTECO Wood Technology Centre (ARTECO) was established in January 2009 by the company ARTISAN in cooperation with the Excellence in Innovation (EI) Project. The mission of ARTECO is to become a unique, leader-oriented and self-sustainable technology wood industry centre. ARTECO has sold its services to over 200 small and medium-sized enterprises.

6.2.4 Example for a business network in the forest-based sector

Sector business cooperation, clusters and platforms are important for inter-sectoral business but also for international import/ export relations. In this respect, internet platform gain increasing importance for establishing contacts.

One example is the platform Fordaq (www.fordaq.com), where currently 579 forest and wood-based enterprises are listed for BiH, the major amount which are small and medium-sized enterprises (SMEs) in forestry operations, firewood sales, manufacturing, and trade/export.

The platform allows queries for activities and main products (including tree-species specifics) as well as the company type and certification information of the members.

6.2.5 Innovation in the forest-based sector

Systematic documentation of innovation in the forest-based sector does not exist. Since the core of the study is not on technological innovation in industries, but rather on the product side, some examples were found that can demonstrate the innovativeness particular in the wood-processing sector.

The Sarajevo Business Forum 2011 had a focus point on wood industry and provided an opportunity to sell ideas for investments. Among other things, the proposed cases entailed:

- High end solid wood furniture manufacturing including marketing of wood products with ecological standards;
- Production of environmental barrier materials for knitting and knitted fences;
- Full hardwood furniture, a new line of horticultural products, eco children's toys;
- Production of eco-pellets;
- Production of wood briquettes;
- Product design;
- Production design services for the BiH Furniture Sector.

6.3 Forest technology and infrastructure

6.3.1 Technology and contracting

One negative legacy of the socialist period in most Central and Eastern European countries was the much higher input of man-hours than in Western Europe for the same operations (Tosterud and Nordberg, 2010). The resulting low productivity made achieving profitability and increasing salaries very difficult (Tosterud and Nordberg, 2010). Nowadays, forest utilization practice in FBiH is organized in conditions of relatively cheap work force (particularly in comparison with numerous European countries) and resulted in a relatively low level of available investment funds (Gurda et al., 2011).

Generally, harvesting infrastructure is relatively poor in both entities with harvesting contractors are usually small with annual capacities of less than 10 000 m^3. There are only a limited number of larger harvesting companies with annual capacities in excess of 20 000m^3. These capacities are extremely small by European standards. There is a lack of investment in new machines and technologies due in part to a combination of:
(a) Limited access to finance;
(b) Lack of continuity of work; and
(c) Low profit margins.
The prevailing harvesting method is the motor manual longwood system in contrast to the highly mechanised and capital intensive shortwood systems which prevail elsewhere in Europe. Trees are felled by chainsaw and then extracted to roadside either as entire stems or long lengths, depending on tree size. Due to the difficult terrain and characteristics of the road infrastructure, pre-bunching in advance of extraction is a frequent occurrence. Skidding is the principal extraction method and is typically by four-wheel drive (4WD), split frame skidder, many of which are imported second-hand units. Extraction distances reflect the poor road infrastructure and can be excessive and the use of skid roads is common practice. Productivity in thinning and final felling is low and in instances poor skills can result in lower than optimal value recovery[21]. The unit harvesting costs are competitive compared to the European average due to the relatively low wage rates.

Results of the study on "Technologies in forestry, standards of wood assortments and forest biomass" conducted within Forest Programme (FP) preparation in the FBiH, revealed following:

a) Around 90 percent of the processing of wood assortments after felling are conducted in the cutting area;
b) Cutting wood on standardised-length wood assortments (cut-to-length method) is the dominant technology of forest utilization in most of the cantonal forest enterprises in FBiH (78 percent) while in case of private entrepreneurs it is almost the only method used (98 percent);
c) In exceptional cases, small amounts of logs have been additionally processed/ finalized outside of the cutting area (11–12 percent), particularly when cutting longer wood assortments (tree-length and long-length method).

Forest utilization in FBiH is partially mechanised (Gurda et al., 2011). The same also holds for RS. This means that tree felling is generally carried out by using chainsaws. In BiH there is still practically no alternative to the chainsaw (USAID-FIRMA, 2012).

21 Based on presentations and discussions arising from USAID FIRMA conference, Sarajevo, 22 March 2011 and on series of interviews with PFMC representatives

This does not mean that the possibility to use mechanical harvesters with trimming, primarily in conifer plantations, should not be explored (USAID-FIRMA, 2012). Experiences in neighbouring countries, especially Croatia, provide a lot of examples of the successful application of harvesting technology and the benefits it brings, such as increased safety, a reduction in the size of timber yards and the rationalization of transportation (USAID-FIRMA, 2012).

For the purpose of the abovementioned study, carried out within Forest Programme preparation in the FBiH, analysis of the current state of mechanization takes into consideration the number and type of mechanization, their ownership (Cantonal forest management enterprises versus Private entrepreneurs) and technical obsolescence. Analysis included 506 chainsaws (328 from Cantonal forest management enterprises and 178 from Private entrepreneurs). Forty five percent of the chainsaws owned by Cantonal forest management enterprises are 1-2 years old. On average, chainsaws owned by Cantonal forest management enterprise are 2.5 years old. Fifty percent of the chainsaws owned by Private entrepreneurs are 1-2 years old. On average, chainsaws owned by Private entrepreneurs are 2.25 years old. Twenty five percent of chainsaws are older than three years. According to the Annual Forest Bulleting of RS (Institute for Statistics of RS, 2013), there were 458 chainsaws in RS in 2012.

Both Cantonal forest management enterprises and Private entrepreneurs have relatively small number of tree-splitting machines albeit they can be used as good way for utilizing forest biomass (Gurda et al., 2011).

In BiH, long distance transports of wood assortments are conducting by trucks both with and without hydraulic cranes. Analysis conducted for the purpose of the study within Forest Program of FBiH revealed that 44 percent of long distance transports were carried out by cantonal forest management enterprises while 56 percent were done by private entrepreneurs (Gurda et al., 2011). In total, 14.6 percent of trucks do not have hydraulic cranes. These are mainly older vehicles that are 13.5 years old on average. Of the trucks that have hydraulic cranes, 67.5 percent are older than 10 years.
Official statistics for RS revealed that in 2012 the number of trucks owned by the enterprise "Šume RS" were 30 trucks while number of tractors were 76 (mainly modified agricultural tractors) (Institute for Statistics of RS, 2013).

As regards forestry operations, we can conclude the following (based on Gurda et al., 2011):

- 88-89 percent of the feelings organized, whether by cantonal forest management enterprises or private entrepreneurs, have been planned and organized in groups of one lumberjack and one assistant (1+1 method);
- In most of the cases (75 percent in case of cantonal forest management enterprises and 92 percent in case of private entrepreneurs), skidding, as form of primary transport, have been realized with horses, anchor on tractor or their combination (horses on steep slopes and on longer distances from forest roads and anchor for their further skidding closer to forest roads). Using horses for skidding wood assortments is chosen mainly because of ecological reasons. Skidding by tractors with anchor justify application of adapted agricultural tractors in case

of longer wood assortments. Therefore, combination of horses and anchor on tractor is compromise solution (Gurda et al., 2011).

- In both cases (Cantonal forest management enterprises or Private entrepreneurs), primary transport require significant amount of physical work
- Generally, organizational structure of primary transport is one driver of tractor plus one assistant responsible for anchor
- Analysis revealed large variety in organization of loading and long-distance transport. When long-distance transport is conducted by private entrepreneurs, realization of shipping and transport by themselves is preferred. 42 percent of the analysed private entrepreneurs are not involved in long-distance transport and loading of the assortments. On contrary, these phases are mainly conducted in cooperation of Cantonal forest management enterprises and third parties.

Based on the conducted research on technologies, technological processes and machines, following conclusions on current state of forest utilization practices are driven:

- Variety in organizational solutions impede planning, designing, realization and control of technological process. Furthermore, this situation could increase probability of causing serious damages of forest ecosystems and injuries at work. This impedes implementation of modern technologies in forest utilization activities.
- Involvement of Cantonal forest management enterprises in all phases of forest utilization process is acceptable since it assures continuity in managing technological processes. On the other side, involvement of Private entrepreneurs is needed for the purpose of increasing competitiveness.
- Processing of wood assortments at the cutting area is imposed by method of forest utilization process. Implementation of this approach is resulting with lower implementation of mechanization in forest utilization, difficult working conditions and limited chances for increasing work productivity. On the other side, such an approach in forest utilization has the smallest impact on the ecological stability of forest ecosystems.
- Having in mind difficult terrain and low density of forest roads, adopted agricultural tractors represent the most efficient mechanization in forest utilization activities in BiH. It has best results in case of combined primary transport (horses and tractors with anchor).
- Long-distance transports by trucks with hydraulic cranes is the best solution both from economic and ecological aspects.

Table 6.12: Forest management operations schemes in BiH (Gurda et al., 2011)

Type of felling	Conditions for application	Place and method of processing	Mechanization to apply
Selective cutting	Ecologically sensitive areas; not demanding to medium-demanding terrains; lower cutting-intensity; smaller average tree growing stock, smaller distance of primary transportation	Cutting area, cut-to-length method of technical round wood and pulpwood	Chainsaw, anchor of the tractor, adapted or specialized forest tractors, cable crane, hydraulic crane, truck
Selective cutting	Ecologically lesser sensitive areas; demanding terrains; higher cutting-intensity; bigger average tree growing stock; longer distance of primary transportation	Forest roadside wood storages, tree-length and long-length method processed and wood storage.	Chainsaw, skidder with anchor, cable crane, tree-splitting machines, chipper, processor for tree-splitting, truck with hydraulic crane
Thinning cuttings	Final thinning on not demanding to medium demanding terrains	Forest roads applicable for tractors or forest roadside wood storages, cut-to length or long-length method, central mechanised storages (CMS)	Chainsaw, harvester, horses or portable anchor, portable chipper, forwarder, trucks with specialised for transport of round wood or wood chips
Grouped selective cuttings	Coppice forests and forests with poor quality of growing stock (in this case – cuttings are directed toward improvement of quality of growing stock)	Forests roads (for tractors and trucks), plants for wood-processing (in case when wood-processing facilities are close to cutting area)	Chainsaw, biomass-harvester, horses, anchor, skidder, forwarder, portable chipper, tree-splitting machines, trucks with or without specialised containers
Clear cuttings	Plantations of fast growing species for wood biomass production as energetic resource	Cutting area, forest roads for trucks, plants for wood-processing (in case when wood-processing facilities are close to cutting area)	Harvesters, processors, specialised forest tractors (forwarders), trucks with or without specialised containers for transport of wood chips.

It is possible to improve working conditions in forest utilization practice in BiH and increase productivity and efficacy by transferring part of working activities from cutting area to wood storage (Gurda et al., 2011).

In public forest enterprises (cantonal and RS), contracting is mainly confined to harvesting and road construction. For the majority of other forest activities, own staff is used and there is no history or tradition of contractors who

can provide a wide range of services across all forest activities. The level of contracting varies across the cantonal enterprises and FMUs within JPS Šume RS and reflects the current staffing position rather than any strategic or commercial rationale. However as mentioned previously JPS Šume RS intends to increase its level of own harvesting to reduce exposure to contract prices.

Even though contracting costs are cheaper than own company costs by between 10-50 percent (based on people interviewed), contractors are typically small enterprises with outdated equipment, machinery and work practices. The acceptance of this situation means that the private forest management companies (PFMC) are paying for inefficiencies and there is little or no incentive on the part of contractors to change their work practices.

The contracting resource is not being actively managed or developed. It will be important for the development of the overall forest sector that the PFMCs, especially the larger ones, actively develop this contracting resource both in terms of (a) technical skill and operational efficiency and (b) business skills. A viable, cost efficient contracting resource is essential to the future development of the forest sector. The aim should be to have "contractors of scale" available. One or more of the PFMCs will have to take the initiative and identify a number of potentially suitable contractors that it can work with to develop into efficient businesses. Currently due to State procurement rules, the companies cannot guarantee work for these selected contractors which would enable them to plan and invest in technology. However, the PFMCs could package work so that it encourages the development of these contractors and it could work more closely with them in building up their technical skills.

6.3.2 Accessibility of forests

The forest resource is poorly served in terms of road infrastructure (World Bank, 2012). In 2012, the total length of forest roads in the FBiH, without data from Hercegovačko-Neretvanski Canton, was 10 499 km (FBiH Ministry of Agriculture, Water Management and Forestry, 2013). In 2012, total length of roads in public forests in Republika Srpska was 9 825 km of which 6 732 km were forest roads and 3 093 were public roads (Institute for Statistics of RS, 2013).

The average road density in different cantons in the FBiH varies between 7 and 14 m per ha (FBiH Ministry of Agriculture, Water Management and Forestry, 2013). In total, average road density in the FBiH is 10.9 m per ha (FBiH Ministry of Agriculture, Water Management and Forestry, 2013) and 9.05 m per ha in RS (World Bank, 2012). Therefore, average road density in BiH is 9.97 m per ha. These densities are significantly below other European countries with broadly similar topography (Austria 36 m per ha, Switzerland 40 m per ha, France 26m per ha, Germany 35 m per ha) but somewhat better than Romania (6.5m per ha) (World Bank, 2012). A study undertaken as part of the Forest Programme (FP) preparation in the FBiH called for a minimum density of 15 m per ha (Sokolović et al 2011 cited in World Bank, 2012).

The low average density results in part of the forest resource being practically out-of-reach for technical and economic reasons (World Bank, 2012). The road network is unevenly distributed with the more mountainous

regions having the lowest density (World Bank, 2012). Furthermore, differences in road density exist between coppice and high forests. Due to insufficient or complete lack of forest roads, coppice forests are almost completely unmanaged. Furthermore, parts of the road network have suffered, especially in recent years, from a combination of torrential rains and lack of investment in maintenance and rehabilitation (World Bank, 2012). The low density and relatively poor condition of the road network has significant consequences for harvesting and transport resulting in higher costs due to longer extraction distances to roadside and less than optimal on-road movement unit costs (World Bank, 2012). Moreover, lower density of forest roads increase chances for environmental damage of forest ecosystems during forest utilization activities.

In BiH, another important aspect of forest accessibility refers to issue of landmines. The area of forest and forest land inaccessible due to the suspected or confirmed presence of landmines/ERW is 420 100 ha (USAID-FIRMA, 2012). Most of these areas, according to the characteristics of the terrain and vegetation, would otherwise evolve to forests and forest land of productive character: about 407 000 ha in total, including about 220 000 ha of high forest and about 154 000 ha of coppice forest (USAID-FIRMA, 2012). By resolving this problem the available surface area for exploitation of forests would be significantly enlarged (USAID-FIRMA, 2012).

6.4 Forest Services

6.4.1 Societal demands – a case study

About 60 percent BiH's population live in rural areas, and for them forests serve as an important source of employment, energy and recreation. BiH anchors much of the biological diversity and broader natural resources of the Balkans. The country's rich biodiversity includes over 5 000 confirmed taxa of vascular flora, including 450 of which are endemic to BiH only (The World Bank, 2008). With such natural preconditions, tourism is officially recognized as an important pillar of the national economy. According to World Tourism Organization (WTO, 2006), BiH had the annual growth of 4.5 percent which is almost double more than the average growth in Southern Europe and Mediterranean countries. It was estimated that 12 percent of the national economy is somehow connected with tourism and the travel industry (USAID, 2008). Still, the positive trend is continuing, so the annual tourist growth in 2008 was more than ten percent (The news and views of Southeast Europe, 2008). Due to tremendous changes in lifestyle, social functions of forests (recreation, tourism, education, culture, art etc.) become important for the urban population. For instance, in the Canton Sarajevo, as the most developed part of the country, forests cover more than 65 percent of the territory and the biggest portion of forests is situated in locations where the local population regularly go on excursions. Forest resources and associated natural features are recognized in the Spatial Plan of Canton Sarajevo as important preconditions for the development of ecotourism and recreational activities (Institute for Development Planning, 2006). On the other hand, the studies of the population's demands towards forests as well as behavioural patterns of forest visitors were rarely conducted. Due to the fact that Canton Sarajevo is quite a congested area, the social demands of the citizens have to be seriously considered in forest policy while the participatory decision making approach has to be applied in spatial planning process.

As concerns the social forest functions, the changes in the society demands towards forests depends on many factors. The interactions between different forest policy actors have become more complicated when confronted with democratization of BiH society and pluralization of political system. The best solution seems to be the concept of multifunctional forest management, which can secure an appropriate balance among different stakeholders' demands towards forests. However, this is also the most complex and most expensive option. The expectations of society from forests, particularly in urban areas, are dramatically changing. In urban dwellers' perception, forests are not only the ecosystem which supplies wood; – nowadays, it is perceived as the most important element of overall environment. In order to create a consistent forest policy, it is necessary to take into the account the interests of all stakeholders as well as the interests of the public in general, articulated through identified social demands of the population towards forest. Sectoral policies (including forest policy and forest ecotourism as its integral part) cannot be developed independently without cross-sectoral coordination and harmonization. This means that the concept of "sectoral exclusivity" has to be altered towards a cross-sectoral, "territorial" approach in creating strategic development directions.

To be able to satisfy the ecological and social demands of the population regarding forest resources and promote forest ecotourism development, public forest management companies have to pass through the process of reengineering. The results of the studies on social, cultural and recreational demands of the population towards forests in BiH, clearly point out on close interactions between the society and forestry as well as the ways of possible organizational changes in public forest management companies (Avdibegović, 2006). Possibilities for improving the quality of forestry business come from the promotion and supply of new forest services (such as forest ecotourism) to potential consumers. Besides, respecting and satisfying the needs of the population in formal forest policy implies substantial financial support by policy decision makers to public forest management companies. In 2004, almost 11 percent of total income of the public forest management company in Canton Sarajevo came from the Cantonal Government as financial support for promotion of different social forest functions such as management of protected areas and improving forests recreation infrastructure (Avdibegović et al, 2006).

For the forest sector this means a shift towards multifunctional forestry with a grade of social responsibility and the management of forest resources based on principles of sustainability while satisfying changing ecological, social and economic demands of society towards forests. This entails:

- Maintaining the legitimate right of management of all forest resources for both companies and private forest users and dwellers;
- Continuously improving the state of forests and ensuring sustainability of commonly useful forest functions;
- Applying modern forestry science achievements and implementing multifunctional forestry concept as a recognisable business elements;
- Continuously increasing the net income and profit of companies;
- Increasing the share of other forestry

products and services in production portfolio;
- Improving the image of forestry companies and the forestry profession as mediators between society demands and forest resources;
- Maintaining the role of leading business entities in the areas that traditionally depend on forestry and wood-processing industry;
- Improving the company's attractiveness regarding employment of highly motivated, university educated experts in forestry and other professions;
- Implementing forest certification concept according to internationally recognized standards for sustainable forest management.

6.4.2 Carbon sequestration projects and contribution to climate change policies

In December 2000, the BiH National Focal Point to UNFCCC was appointed and in 2001 the State Steering Climate Change Committee of BiH was established as a governmental body facilitating Bosnia and Herzegovina's climate change activities. It has the leading role in major decision-making on possible policies and measures in the field of climate change. At present, on the institutional side, the Ministry of Spatial Planning, Civil Engineering and Ecology in Republika Srpska, as the BiH Focal Point to the UNFCCC, the State Steering Climate Change Committee and Sub-committee and Secretariat for Climate Change of Bosnia and Herzegovina, the GEF Operational Focal Point in BiH, are responsible for co-ordinating all climate change activities at the level of Bosnia and Herzegovina and international level. A Medium-Term BiH Program of Activities on implementation of UNFCCC for the period 2002-2006 was developed based on conclusions, recommendations and suggestions of the Round Table meeting and was adopted by the State Steering Climate Change Committee of Bosnia and Herzegovina at its second meeting in 2002.

Bosnia and Herzegovina, as a party to the UNFCCC, has participated in the work of Conferences of the Parties (CoP6 to CoP13) and has carefully analysed its obligations towards the Convention, such as commitment to prepare its Initial National Communication. Unfortunately, due to post-war activities that have occurred during the last decade, Bosnia and Herzegovina, as a developing country, has found itself in quite a difficult economic situation. The basic infrastructure systems, including meteorological and hydrological observation and telecommunication system, as the integral part of WMO/World Weather Watch and Global Climate Observing System, were destroyed and the technology that exists is outdated. Due to this situation, national data on climate change is poor and there is a lack of reliable regional and local climate data. In addition, consideration of climate change issues are yet poorly integrated into sectoral and development policies; national capacities for planning and policy development is weak, vulnerability assessment and development of mitigation and adaptation measures are weak and awareness of decision makers on climate change is low.

According to the 2013 Progress Report of Bosnia and Herzegovina towards the EU, prepared by the European Commission[22], no progress had been made on general policy development in the field of climate change mitigation. Climate considerations are

22 http://ec.europa.eu/enlargement/pdf/key_documents/2013/package/ba_rapport_2013_en.pdf

increasingly integrated into the energy policy, although substantial efforts are required to fully integrate climate change into sectoral policies and strategies.

Furthermore, this report concludes that the country is at a very early stage in adopting the climate *acquis*. The country has taken initial steps to identify stationary installations for the future implementation of an emissions trading system. Significant efforts are required to strengthen the country's monitoring, reporting and verification capacities. Cooperation and coordination remain weak. The lack of administrative and financial capacity is delaying preparation, legislative alignment and implementation of a climate policy in line with the *acquis*. The country participated regularly in the climate work under the Regional Environmental Network for Accession (RENA). There is still a significant need for awareness-raising at all levels and for cooperation from all stakeholders.

Temperature increases in Bosnia and Herzegovina are likely to have largely detrimental impacts, particularly as predicted higher temperatures are associated with reduced rainfall and higher evaporation rates for inland areas of the country. An average temperature increase greater than 2°C will result in costly adaptation, and impacts that will exceed the adaptive capacity of many ecological systems.

According to the Climate Change Adaptation and Low Emission Development Strategy for Bosnia and Herzegovina, climate change could affect the forests of Bosnia and Herzegovina in a profound manner, transforming forest ecosystems over time, and altering forest distribution and composition. Some of the forest reserve is more resilient to climate change, although there are still potential impacts. Beech forests, which are largely resilient, could still suffer from pathogens and disease outbreaks, and fire could become a greater risk. The lowland beech forests are at particular risk, especially in low rainfall areas in the northeast of the country. Likewise, low altitude oak forests and high mountain forests are also at risk. Conifers are particularly prone to pest outbreaks in hot temperatures (particularly from beetle attack), as well as from fire risk. Simulations for a 2° C average temperature rise predict significant negative consequences for the distribution of dark coniferous forests. Fir trees are also at risk from increasing temperatures and other species increase their range to higher altitudes. A particular impact that may occur with climate change is 'multiple stresses', where changes in soil humidity, rainfall, temperature and pathogens increase physiological stress to trees

Other factors likely to impact on forest ecosystems include: changes in soil structure, severe temperatures and climatic conditions causing frost and heat stress and changes in of precipitation amount and distribution (snow versus rain, drought versus flood). Another significant threat to forests is an increase in forest fires: higher temperatures and changes in precipitation levels increase the risk of fires in some areas of the country. Climate change may also have some positive impacts on forests and forestry: tree productivity may increase in areas with adequate water availability, resulting in faster growth rates, and there is the possibility of new species emerging.

In summary, climate change is likely to affect the more vulnerable forest ecosystems due

to multiple stresses on trees and forest environments, including drought, pest and disease attack, increased fire risks and changes in soil. The environmental and economic importance of forests in Bosnia and Herzegovina, mean that these impacts could have serious consequences for the country. Adaptation approaches will require improved information for forest management to support changes in species planted, and management interventions to prevent fire and diseases spreading.

The report on Potentials for mitigation measures in forest ecosystems proposed in Initial National Communication (INC) of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC), 2009, suggests the following:

1. Updates of forestry database in order to lay foundations for the best approach to issues related to climate change mitigation;
2. Application of certain silvicultural methods (increasing carbon sequestration in tree biomass), as well as enlarging the forest area through the reforestation of bare lands thus increasing the overall annual biomass increment;
3. Permanent control of forest health conditions and monitoring, increase of thinning activities and planting pioneer wood species on the degraded forest lands;
4. Increasing fire protection measures and generally expanding the forest and mountain areas under protection in order to address the threat to biodiversity and to promote ecosystem management (BiH has vast portion of threatened species, yet only less than 1 percent of its land is currently set aside as protected).

Implementation of these activities that could help in mitigation of greenhouse gas emissions in the forest sector required financing mechanisms.

In light of this, the Initial National Communication (INC) has suggested the main categories of mitigation measures that should be developed in the form of project proposals. They are as follows:

- Maintaining/increasing stand-level carbon density (tonnes of carbon per ha) through stand improvement, de-mining forest areas, regular thinning, uneven-aged stand management and overall increase in forest productivity;
- Maintaining or increasing the forest area through afforestation/reforestation and rehabilitation of bare lands;
- Increasing carbon sinks through forest conservation and increasing fire protection measures and permanent control of forest health;
- Increasing off-site carbon stocks in wood products and increasing the use of biomass-derived energy to substitute fossil fuels;
- Promoting forest certification in order to enhance SFM, reduce forest misuse, involving local communities and stakeholders and raising awareness on the importance on climate change mitigation

Finally, it is important to mention that study on “Forests and climate change” has been conducted as part of NFP of FBiH. This study recommends further steps directed toward research related to adaptation of forest ecosystems on climate changes, possibilities of using carbon sinks credits, CDM mechanisms and adoption of proper sectoral

strategy on climate change mitigation. Still, no exact data on the role of forest ecosystems in carbon sequestration and contribution to climate change are available.

6.4.3 Forest protection and protective services

The size of the protected areas in BiH accounts for approximately 2 percent of the country, far below the level of the surrounding countries (Dalmatin et al. 2010). Calculated in hectares the surface of protected areas in Bosnia and Herzegovina is equal to 102 258 ha. Apart of formally protected areas (e.g. national parks), the role forests in protection services has been recognized in forest legislation of both entities. In Article 38 of the FBiH Law on Forest from 2002 it is stated: "To ensure their protection or special management regime, certain forests may be declared protective forests or special purpose forests. They shall be managed in such a manner that shall ensure the achievement of the purpose for which the forest has been designated." Although it has been proclaimed invalid since 2009, it is worth mentioning the definition of protective forests according to the FBiH Law on Forest from 2002 (Article 39.). These are:

- Forests whose main objective is to preserve soils on steep slopes, and soils endangered by erosion and torrents, landslides and harsh climatic conditions, which endanger the very existence of the forests;
- Forests whose main objective is protection of inhabited areas, industrial and other installations, such as roads, telecommunication and energy infrastructure, water springs and waterbeds, banks of water accumulations, as well as forests established as protection belts or whose purpose is protection against natural disasters and calamitous effects of human interventions.

The same Law offered the definition of special purpose forests (Article 40.) as follows:

- Forests, or pails thereof, having special cultural, historical, ecological and natural significance, national parks, natural and hunting reserves;
- Forests of special importance for defence and the needs of the armed forces of the Federation;
- Forests and forestland of importance for protection of biodiversity and natural habitats of flora and fauna;
- Forests, or parts thereof, registered as seed stands and facilities to produce seeds;
- Forests of special importance for science and education;
- Forests of special importance for purification of air, water supply and quality;
- Forests designated for the purposes of public rest, general education, recreation, tourism, climatic and other resorts.

The similar definitions and regulations on protective forests and special purpose forests can be found in the Law of Forest in Republika Srpska from 2008. It is stated in Article 7 that: "Protective forests are those forests that serve primarily for the protection of land, waters, settlements, economic or other facilities from natural disasters, and the forests raised as protection belts and forests on the upper boundary of vegetation. Special purpose forests shall be those forests that are especially rare in nature or have a special cultural, religious, or historic importance - national parks, natural parks, nature preserves, forests intended for resting, sports, recreation, teaching, and scientific

research, climatic and other health resorts, hunting grounds, as well as forests of special interest for national defence, seed growing and seed facilities, and sources of potable water."

According to the data presented in the section 3.1.2., there are 7 600 ha of protective forests and 14 800 ha of special purpose forests.

When it comes to the role of forests in protection services in BiH, the concept of high conservation value forest (HCVF) must be mentioned. In the process of FSC forest certification, all forest companies were obliged to determine a certain percentage of high conservation value forest (HCVF) within the forest management area (FSC Principle 9). FBiH Ministry of Agriculture, Water Management and Forestry issued Guide for Designation of High Conservation Value Forests in Bosnia and Herzegovina in the 2008. The guide has been prepared by the consortium of international companies with the purpose of creating a methodological framework for determination, identification and management of forests with special social, ecological and economical values that should be protected. Based on FSC certification reports for four certified forest companies, there are 75 530.26 ha (i.e. ca. 2.5 percent of total forest cover) of HCVF forest in Bosnia-Herzegovina.

As regards financing of protection measures, these are regulated in the respective FIBH Laws on Nature Protection. This entails:

- Law on Nature Protection of the FBiH, Official Gazette of the FBiH, No. 66/2013, Section XV: Financing of the nature protection, § 208

In the budget of the FBiH, as well as Fund for environmental protection of the FBiH, financial resources are guaranteed for protection of natural values, monetary and other types of subsidies prescribed by this Law, payment for damages caused by protected animals, for granting the right of the Government of the FBiH to be the first buyer as well as for financial compensation to the owners and users of estates in the protected areas that are of international, State or FBiH importance.

In the cantonal budgets, funds are available for the protection of natural values which are proclaimed by cantons, monetary and other types of subsidies prescribed by this Law, fulfilment of right of first buyer as well as for financial compensation to the owners and users of estates for limitations they are facing.

In RS, sources of financing for the protection of natural habitats are gathered through utilization of natural resources and protected natural values, unless it is differently prescribed by this or other Law, financial compensations from concessions or other sources prescribed by this Law or specific regulations adopted based on this Law.

- Law on nature protection of Republika Srpska, Official Gazette of RS, No. 59/08, Section XII: Financing of the nature protection, § 49

Funds for the accomplishment of the objectives prescribed by this Law are provided from:

- Budget of Republika Srpska, and
- Fund for environmental protection.

Funds from the paragraph 1 indent 1 of this Article are using for elimination of consequences of the damages caused by unknown person, when the cause of the

damage is known and in the cases when the prompt intervention directed toward nature protection is needed.

Funds from the paragraph 1, indent 1 of this Article are used for nature protection for:

- Accomplishment of the goals and objectives prescribed by this Law;
- Creation of the Strategy and plans which is in accordance by this Law;
- Reduction of damages and threats for nature;
- Re-cultivation of landscape;
- Preservation of the protected areas and nature protection;
- Support and improvement of the most efficient methods of nature protection and management;
- Rising public awareness on nature protection and management;
- Research activities which are dealing with nature protection.

Beyond state funding, no private financing nature protection (such as contractual nature protection) or payment for ecosystem services schemes are known yet.

6.4.4 Biodiversity conservation and management

Because BiH anchors much of the biological diversity of the entire Balkan peninsula, it plays a pivotal role in the environmental health of the region. It appears that BiH is one of the five European countries most rich in species, although about 19 percent of the plant species in BiH are thought to be under significant threat from land conversion, unsustainable forest management, and exposure to pollutants. Thus, while BiH is an important centre of biodiversity for the region, it has the highest proportion of threatened species of any country in Europe. Threats to biodiversity fall into two general categories: (1) widespread intractable threats inextricably linked to post conflict economics; and (2) more immediate threats that have more measurable impacts but may also have medium-term solutions. Among the macro threats are a weak economy that forces mining of otherwise renewable natural resources; limited public awareness of mechanisms to improve resource conservation; lack of a coherent legislative framework and of substantial regulatory capacity; and policy and market failures that substantially undervalue environmental goods and services (USAID 2003).

Bosnia and Herzegovina has a long tradition in protection of natural values. The law on nature protection of National Republika BiH from 1946 has regulated a management of nature characterized by special biological and landscape values. The same law requires an inventory to be completed and designation of protection level for natural objects possessing different values (FBiH Ministry of Environment and Tourism 2009).

The spatial plan of BiH for the period 1981–2000 predicted protection of 8 062 km^2 or 15.03 percent territory of the state (Institut za arhitekturu, urbanizam i prostorno planiranje Arhitekstonskog fakulteta u Sarajevu 1980). Until the 1990, in accordance with laws on Nature protection and law on Protection of cultural, historical and natural heritage only 0.55 percent territory of BiH was protected (NEAP 2003).

Recent developments in the history of Bosnia and Herzegovina have also had an extremely strong impact on the area of natural resource management. Before 1992, the 1965 Law on Nature Protection provided protection to 144 areas of different sizes

Table 6.13 List of protected areas in accordance with IUCN criteria in BiH (Marić 2013)

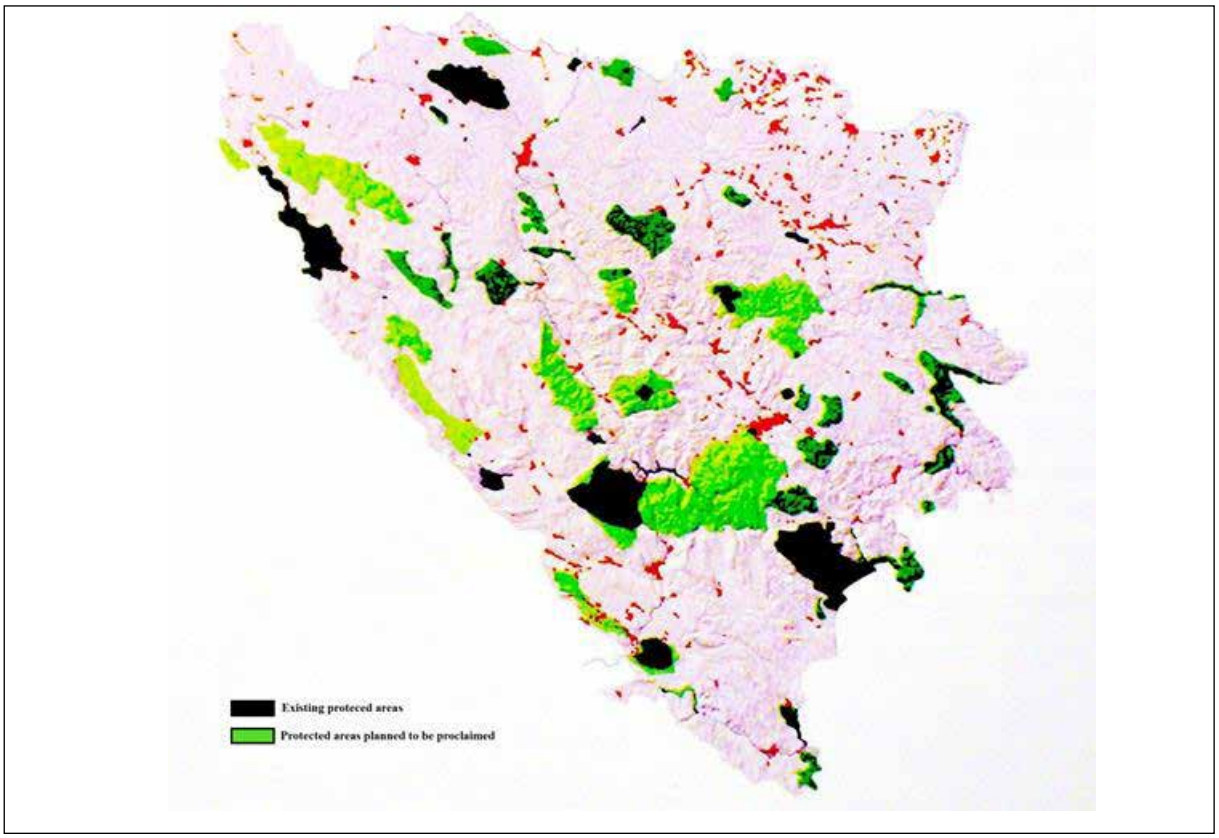
Category of protection	IUCN category	Area ha	Year of proclamation
National park			
Sutjeska	II	17 250	1962
Kozara	II	3 494	1967
Una	II	19 800	2008
Monument of nature			
Skakavac	III	1 430.7	2002
Prokoško jezero	III	2 225	2005
Vrelo Bosne	III	603	2006
Tajan	III	4 948.35	2008
Nature park			
Hutovo Blato	V	7 411	1995
Blidinje	V	35 800	1995
Protected landscape			
Bijambare	V	367.36	2003
Konjuh	V	8 016.61	2009

and levels of protection in the territory of Bosnia and Herzegovina. This Law established 16 strict nature reserves, nine administered (managed) nature reserves, three national parks, six special reserves, 10 reserves of natural landscapes and even 110 nature monuments, among which there were numerous Bosnia and Herzegovina's waterfalls, streams, springs, wells, mountain lakes, grottoes and caves. The practical measures for protection of biological diversity have no longer been implemented in most of these areas even since 1992. In the post-war period, Bosnia and Herzegovina failed to take any appropriate actions towards re-establishing the status on the formerly protected areas and restarting the implementation of the appropriate protective measures (FBiH Ministry of Environment and Tourism 2009).

In accordance with recommendations from new so far have been proclaimed several protected areas in accordance with IUCN criteria Table 6.13.

After the war the jurisdiction on proclamation of new protected areas was under the jurisdiction of entity ministries for nature protection in accordance with entity laws on nature protection. Besides the spatial plan for BiH, the National Environmental Action Plan

Fig 6.4: Spatial distribution of existing protected areas and protected areas planned to be proclaimed (Drešković at al., 2011)



for BiH also recommended the proclamation of new protected areas up to 15 percent of the territory BiH (NEAP 2003).

In total, some 60–70 percent of all protected areas are forests. The three National Parks comprise substantial amounts of forests, which signify the important role of forests therein:

- NP Kozara 92 percent
- NP Sutjeska 66 percent
- NP Una 64 percent

Furthermore, Ramsar sites in Bosnia and Herzegovina are Hutovo blato (Ramsar site number 1105), swamp Bardača (Ramsar site number 1658) and Livanjsko polje (Ramsar site number 1105). Despite all these efforts, BiH managed to protect only 2.6 percent of its territory, far below the regional and European standard. BiH has 134 440,8 ha of protected areas. Beside the existing protected areas it is necessary to effectively protect the following areas: (1) Olympic mountains Igman and Bjelašnica, (2) mountains of endemic centre in Herzegovina-Prenj, Čvrsnica, Čabulja i Vran, (3) Mountain Vranica, (4) Mountain complex Konjuh-Zvijezda-Tajan, (5) Livanjsko polje as biggest karst field on the world, (6) mountain Šator and (7) mountains Grmeč and Plješevica (Drešković at al 2011). Spatial distribution of existing protected areas and protected areas planned to be proclaimed is shown on Map 1.

However, biodiversity conservation in Bosnia and Herzegovina faces several crucial problems:

- There is no single agency at the state level competent for the issues of nature protection;
- Financing modes are undeveloped and

inadequate;

- There is a high degree of discordance between pre-war and present protected area categories (designated in accordance with IUCN's categorization). The adjustment of these categories has never been completed.

6.4.5 Forest certification in Bosnia-Herzegovina

All certified forests in BiH are publicly owned and certified by the Forest Stewardship Council (FSC). There are no certified private forests. At the moment four state forest companies have FSC FM/COC certificate. These are as follows: "Unsko-sanske šume", "Hercegbosanske šume", "Šume Republike Srpske" and "Šume Tuzlanskog kantona". There is one cantonal company ("Sarajevo Šume") which lost its FSC certificate as a result of not conducting requested corrective measures. A total of 1 519 234.9 ha of state forests are certified by FSC in BiH. There are 264 231 wood processing companies which possess FSC CoC certificate (FSC, 2014). Forest certification process has been mainly driven by interest of export-oriented wood-processing companies and their needs for better access to global markets.

As concerns corrective action requirements for four state forest companies, these are presented in the following table:

Company	FSC indicators	Corrective action requirements
Šume RS	4.1.7	Not all employees are paid a fair wage and other benefits, which meet or exceed all legal requirements and those provided in comparable occupations in the same region
	4.5.1	Not every effort is made to resolve disputes through fair consultation aimed achieving agreement and consent
	6.2.2	There is not appropriate co-operation with acknowledged experts in identifying rare, threatened and endangered species present
	6.4.2	The forest manager/owner did not define map and mark on the field at least 5 percent of the total managed forest land as reference sites within 5 years after certification effective date
	9.3.2	The plan does not describe the specific measures to be taken to enhance the identified attributes of HCVFs
	9.4.2	The records of monitoring of HCV attributes are not kept
Šume TK	1.2.1	There is no evidence that all required payments have been made
	4.4.7	Sites of special cultural, historical, ecological, economic or religious significance are not identified in co-operation with affected or interested stakeholders
	4.5.2	Dispute resolution is not clearly defined
	7.3.1	Forest workers at all levels of skill and responsibility are not appropriately educated and trained in the tasks they are assigned to and company policy and procedures
	8.1.1	All activities that require monitoring are identified. For large scale organizations these shall be documented in a monitoring programme

Unsko-sanske šume	1.1.2	Forest managers did not demonstrate awareness and compliance with relevant codes of practice. Operational guidelines and other accepted norms or agreements
	4.2.5	Not all necessary tools, machines, substances and equipment, including appropriate PPE, were not available at worksite
	8.1.3	Consistent and replicable monitoring procedures for each activity are not documented in the programme
	9.2.2	Joint analysis and decision making with the stakeholders directly affected was not made for HCVF with cultural attributes
Herceg bosanske šume	4.2.5	Necessary tools, machines, substances and equipment, including appropriate PPE, were not available at worksite and are in safe and serviceable condition
	4.4.3	An up to d ate list of stakeholders is not maintained
	4.4.7	Sites of special cultural, historical, ecological, economic or religious significance are not identified, described and mapped in co-operation with affected or interested stakeholders
	6.5.4	Operators are not aware of and able to implement adequate emergency procedures for cleaning up following accidental oil and chemical spillages
	7.4.1	There are not publicly available statements that provide and up to date summary of the primary management plan elements listed in 7.1 at company level
	8.2.9	In large scale organizations, formal auditing of contractors is not carried out on a regular basis and records thereof maintained
	9.4.1	Monitoring indicators and frequency are not defined in consultation with acknowledged experts, local and national stakeholders to monitor effectiveness of each measure described in the plan
	9.4.2	Records of monitoring are not kept and used in consultation with acknowledged experts, local and national stakeholders, to adapt future management

The draft version of the FSC National Standard for Bosnia and Herzegovina was developed in 2006. The idea was to create the standards at national level to reflect the diverse legal, social and geographical conditions of forests in Bosnia and Herzegovina. Currently, the certification process for RS is completed, while one canton (Sarajevo Canton) lost the certificate in 2010. However, it has to be mentioned that the lack of opportunity for private forest owners to access the FSC certification is a major competitive disadvantage and future efforts are needed to overcome this situation. For this purpose, private forest owners need to organize themselves; e.g. in associations to synchronize their different interests, get information on certification processes and prepare the preconditions for certification in terms of standards, rules of procedure and compliance demands. In fact, given the fragmentation of private forest ownership some forms of group certification might have to be explored.

6.5 Summary

The two predominant features of forest values chains in BiH compared to other countries in the Western Balkans a roundwood

and sawnwood. According to FAOSTAT, in production and export of sawnwood, BiH is number one in the Western Balkans. BIH is the largest industrial roundwood producer and exporter in the region after Croatia. For all other forest-based product Croatia and Serbia show higher values. With a third of its area of FSC certification, BiH is significantly below Croatia (75 percent), but higher than Serbia (18 percent). Comparable data for NWFP are widely lacking.

For the value chains in BiH, the following aspects are important:

- BiH shows huge potential for wood mobilizations, which is currently hampered by not making use of the potential annual allowable cut in public forests, but also insufficiently addressing issues related to private forests. Unravelling this potential would require among others; e.g. better forest road networks, improved methodology for forest management planning, organizing of private forest owners in interest associations, introducing innovative technologies for processing of roundwood with lower dimensions;
- BiH is a net exporter of primary and secondary forest products, and there is potential to generate domestic value-adding processing business. Further processing steps are currently undertaken in the neighbouring countries to which wood and wood products are exported;
- Exports of wood products show increasing trends while imports are stagnant, which provides a trade balance surplus to the country;
- The wood-based sector is a sector of growth in BiH both as regards revenues and exports;
- The employment rate in the wood-based industries is increasing, but for the forest-based sector in general modern skills and know-how are a bottleneck;
- The results show that the production and sales of sawnwood is by far the most important product category in BiH, with some certain significance for wood manufacture and furniture;
- The role of NWFP is currently underestimated, but seems to play an important role for RD both in marketed and non-marketed NWFP. Currently, aromatic and medicinal NWFP are properly documented, but given a rather narrow definition of NWFP in BiH there is room for development of the NWFP sector;
- Value-adding steps of NWFP processing and brand creation can create new market opportunities;
- Organization of production and marketing associations is still absent in the forest sector. In the wood-based industries there are some first examples of professional clusters, which can serve as role models for other sub-sectors;
- Integrated approaches to Eco-tourism and nature protection show quite some potential, but require a change in forest management planning and introduction of participative and cross-sectoral processes. Private financing mechanisms and investment opportunities have to be explored;
- Climate change and carbon trading mechanisms have to be explored as synergetic marketing options (e.g. REDD+);
- Forest certification bears huge potential for multi-functional forest management. Access to certification for private forest owners has to be facilitated in order to avoid competitive disadvantages.

7. Policy and governance

Forest governance is a broad term involving multiple actors, complex actions, and interrelationships, many of which are relatively poorly understood. It is largely unknown how various initiatives associated with forest governance influence people's livelihoods and sustainable forest-related development in BiH (Mutabdžija 2012).

7.1 Legal framework

The regulatory framework in BiH is complex, and poses a major issue when addressing the needs for adaptive and participatory forest management.

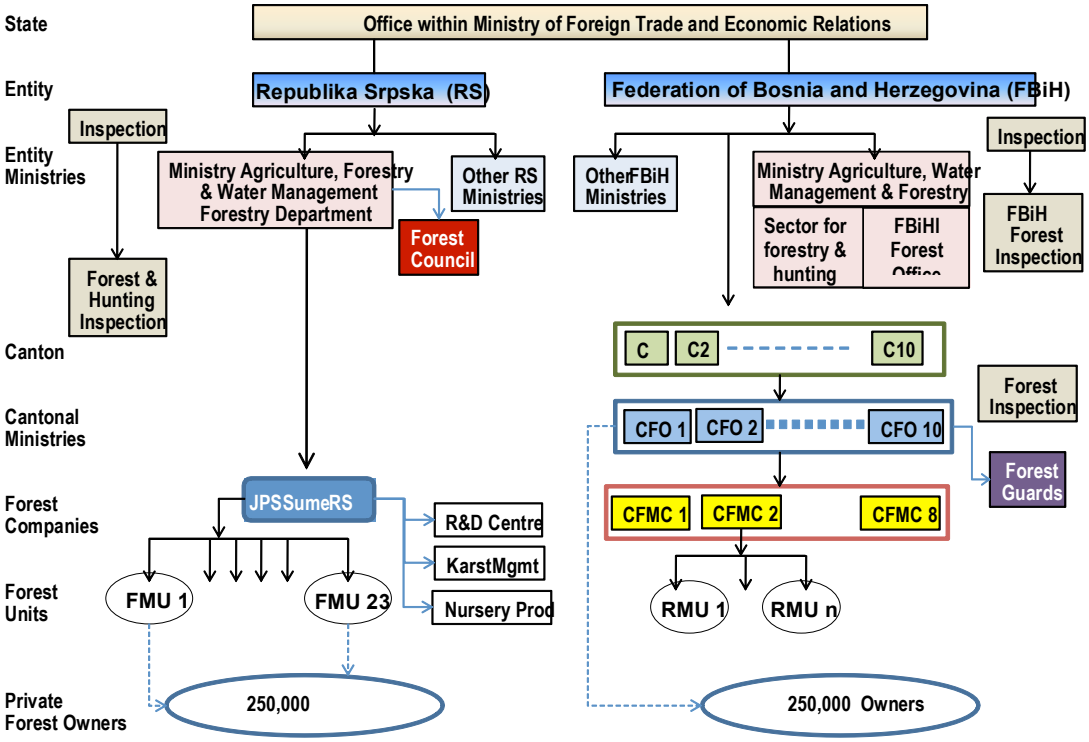
As shown earlier, the sector is organized on the entity level. As regards forest legislation this entails:

- RS Forest Law (2008) provides the overall framework and is supported by a series of 32 regulations adopted during 2009–2010 relating to timber sales and technical norms of forest management. The Forest Law 2008 clarified the Entity ownership and administration responsibilities. Further elements of forest planning and principles of sustainable forest management are included in the 2008–2015 RS Spatial Plan, which provides for the development of planning documentation, including the Strategy for forestry development for the period 2011–2021 (published in 2012), as well as for revision of laws and regulations including the Law on Forests.
- Based on the Decision by the Constitutional Court of the Federation of Bosnia and Herzegovina of 14 April 2009 (Official Gazette of the Federation of BiH no. 36/09) Law on Forests (Official Gazette of the Federation of BiH no. 20/02, 29/03 and 37/04) is no longer in force as of 27 November 2009. As a preliminary solution pending the adoption of the new law on forests, the Government of the Federation of BiH adopted the Regulation on Forests (Official Gazette of the Federation of BiH no. 83/09, 26/10, 33/10 and 38/10). As per the Decision of the Constitutional Court of the Federation of BiH no. U-28/10 of 23 March 2011 (Official Gazette of the Federation of BiH no. 34/11), the Regulation on Forests should have been in force until 6 December 2011. Since the Regulation on Forests as of 6 December 2011 is no longer in application and as the Law on Forests hasn't been adopted yet, the forest sector is legally unregulated at the level of Federation of BiH.
- Brčko District adopted its own Forest Law in 2010. Based on its provisions, there are Forest management plans for public forests (owned by the District) and for private forests (both plans for the period 2007–2016). Following the legislative obligations the annual management plans are prepared and adopted by the Government of the District, which include necessary measures related to harvesting, silviculture, forest protection and guarding. In Brčko District, which is mainly lowland and agriculture area, forestry plays a subordinated role due to small area covered by forests and small amount of harvesting operations.

In the broader context of rural development, which is the underlying principle of IPARD in the EU, the Law on Agriculture, Food and Rural Development is relevant in BiH. Specific forestry-relevant aspect are addressed in:

- Article 2 (c) - Sector scope: "Agriculture, Food and Rural Development sector"

Fig 7.1: Organization of the forest sector (WB, 2012, modified)



includes: Forestry and forestry products (as this relates to EU integration)

- Article 3 (i) - Meaning of terms: "Rural development plan" means a range of measures aiming at improving the competitiveness of agriculture and forestry; improving the quality of the environment and the countryside; encouraging diversification of economic activities and improving the quality of life in rural areas.
- Article 4 (1a) - BiH Sector Framework Objectives: The objectives of BiH sector policy are to activate unused natural and human resources, and to develop sustainable, competitive and dynamic agriculture, forestry and food sector.

7.2 Organization of the forest sector

The organizational set-up and institutional arrangements of the forest sector is shown in Fig 7.1.

As mentioned earlier, direct competences in forestry are held at the level of entities (FBiH and RS) and Brčko district. The institutions at these levels are responsible for forest policy making and for forest legislation and law implementation. Apart from responsibilities for foreign trade and international economic relations, the Ministry of Foreign Trade and Economic Relations (MOFTER) is responsible for tasks and duties falling within the jurisdiction of the State of BiH, including defining policies and basic principles, co-ordinating activities and consolidating entity plans with those of international institutions in the areas of agriculture, energy, environmental protection, use of natural resources and tourism. Within MOFTER, Sector for agriculture, food, forestry and rural development exists, but

regarding forestry issues it mainly deals with co-ordinating activities.

In RS, the most significant changes in the institutional arrangements for forestry in recent years entail the following:

- The transformation of the Public Enterprise in RS into a corporation of joint stock company in 2005;
- The reduction of forest management units (FMUs) in RS from 44 to 23 in 2008;
- The incorporation of the Forest and Hunting Inspection into the overall Inspection Service.

In FBiH, the FBiH Forestry Inspection was transferred from the FBiH Ministry of Agriculture, Water Management and Forestry to the FBiH Administration for Inspection Affairs in 2007, and the transfer of the Forest Inspection from the Cantonal Forest Office to the Cantonal Inspection Service in 2007.

7.2.1 Institutional set-up in FBiH

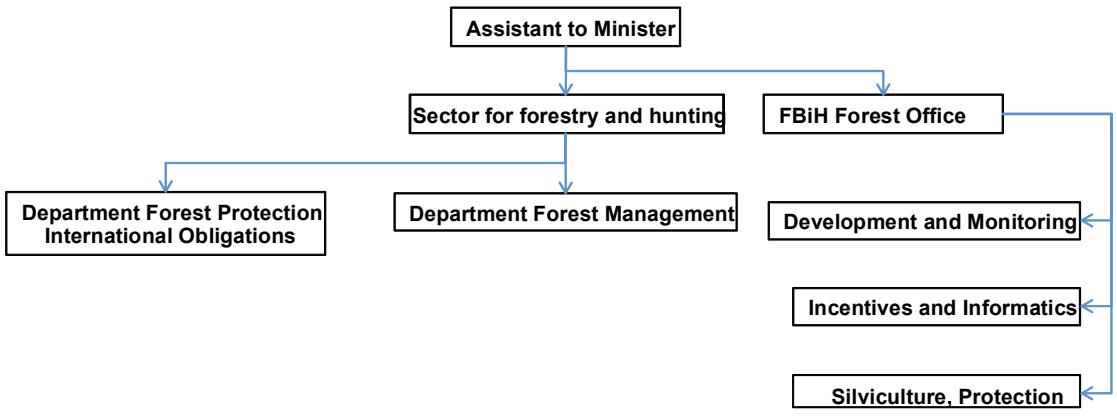
Forest resource ownership and management is carried out at entity level. FBiH devolves its management competencies to the cantonal governments. Each canton has competency over the forest resources within its administrative boundaries. A more controversial issue, however, is the extent to which forest-related mandates.

At the FBiH level, there is a Forestry Department within the Ministry of Agriculture, Water Management and Forestry which comprises two units. The first is a Forest Sector for forestry and hunting Department with responsibilities for legal matters and all aspects relating to forest law and related legislation. It acts as a permitting unit; e.g. change of land use and forest management planning.

Main bodies are:

- The FBiH Forest Office (FFO) is responsible for forest silviculture and protection, users of forest and subsidies and support payments for forestry, as well as the development and monitoring of processes in forestry including an overall monitoring role in relation to activities within the forest sector;
- The FBiH Forest Inspection (FFI) performs overall inspection services safeguarding the implementation of all actions relating to the law on forests within FBiH. In the absence of an adopted law the FFI also operates under the Law on Inspection.

Fig 7.2: FBiH Level Forest Institutions (WB, 2012, modified)



At the Cantonal level, the Ministry of Agriculture, Water Management and Forestry holds the responsibility, except in Sarajevo Canton, Zapadno-Hercegovački Canton and Bosansko-podrinjski Canton, which fall under responsibility of different ministries. In this respect, further important bodies are:

- The Cantonal Forest Office (CFO) to control the activities of the CFMC and provide advice and support to private forest owners. The CFO prepares the FMP for all private owners and plays a major role in guarding and protection of the forest resource including illegal activities. Under the Law on Forests (2002) the CFO was obliged to prepare Cantonal forest development plans every ten years for all forests and forestland, irrespective of ownership, with the aim to ensure sustainable forest management in each of the Cantons. To date no development plan has been prepared. The reasons are many and include lack of capacity, no overall FP to provide guidance and low priority of changing the institutional set-up (WP, 2012).
- The Cantonal Forest Inspection (CFI) forms part of the Cantonal Inspection Service. Their role is essentially the same as that of the FBiH Forest Inspection

7.2.2 Institutional set-up in RS

In RS, the Forestry Department within the Ministry of Agriculture, Forestry and Water Management is responsible for forests and forestry.

Main implementing bodies are (WB, 2012):

- The Forestry Council is a forum for high level discussion on forestry and forestry related issues and developments established under the Forest law 2008. It has nine members comprising representatives of the ministry, other state bodies, institutions and organizations which are related with forest sector, local communities, NGOs, forest owners and others. This currently includes JPS Šume RS and the Forest and Hunting Inspection;[28]
- The Forest and Hunting Inspection (FHI) was transferred from the MAFWM in 2005 to the general Inspection Service, which has a total of twelve Inspectorates. The FHI has six territorial divisions with a total of 17 inspectors. It carries out forest control measures for both public and privately owned forests based on ten year and annual forest management plans;
- JPS Šume RS has a traditional organizational structure for a public forest company. There is a headquarters, twenty three Forest Management Units, a Research Development and Design Centre which undertakes forest management planning, a Centre for Seedling Production and a Karst Management Centre;
- The FMUs report to the headquarters and are managed on an areas bass, comprising a number of forest Districts which in turn comprise a number of management sub units.

7.3 Assessment of institutional conditions in BiH

In order to reflect several aspects of forest governance in BiH, some results of regional research project: "The adaptation of national forest policy

23 As an intermediary institution between the Ministry and public forest company Šume RS, the Forest Agency was established under the Law on Forest of RS (2008) for undertaking activities of technical expert in forestry. Since 2013 it was abolished and does not exit any more. The responsibilities of the Agency have been transferred partly to the Ministry and partly to public forest company Šume RS

systems in South-East European countries (Bosnia-Herzegovina, Croatia, Macedonia and Serbia) to new modes of international forest governance (GovoR)" financed by Finnish Ministry of Foreign Affairs, will be presented here (Mutabdžija, 2013).

Land tenure and property rights are crucial social institutions that define opportunities and constraints related to SFM. Only minor changes happened in terms of land tenure and forest ownership rights due to processes of restitution and denationalization in BiH. The comparison of data from the period of the Austro-Hungarian monarchy with the current size of private forests leads to the conclusion that the share of private forests will not significantly increase as a result of the restitution process (Glück et al., 2011). Although it is generally held that agrarian reform had a strong impact on private land ownership in the former Yugoslavia, the fact is that the land nationalization process has mainly influenced private agricultural properties (fields and pastures) while the greatest part of private forest estates was below the prescribed maximum (Sabadi, 1994).

Individual properties are fragmented and the number of owners is increasing as a result of continuous division owing to inheritance processes (Glück et al., 2011). Similar results of are reported in GovoR project when it comes to the issue of administration of land tenure and property rights (Mutabdžija, 2012).

The organization of the forest sector reflects the constitutional character of the country, where entities and 10 cantons (within FBiH) have strong impacts on forest resource management. Due to the decentralised administrative structure, there is neither a state-level forest policy nor a framework for forest legislation. At the FBiH level there is a Forestry Department within the Ministry of Agriculture, Water Management and Forestry with a unit responsible for legal matters (all aspects relating to forest law and related legislation) and an FBiH Forest Office (FFO) which deals with forestry development and support and has an overall monitoring role. At the Cantonal level, responsibility for forestry rests with the relevant Ministry, within which there is a Cantonal Forest Office (CFO) whose main function is to control the activities of the cantonal forest management company and provide advice and support to private forest owners.

However, the current institutional framework and organization of public forest administration was evaluated as non-functional by key national forest policy actors (Delić et al. 2012). Such decentralised organization calls for a revision of the role of public forest administration. Low quality and adequacy of staff in public forest administration was mentioned in the results of Govor project also (Mutabdžija, 2012).

Traditionally, forest resource management in BiH has been entirely formulated by bodies that have constitutional authority (public forest administration) and is based on a hierarchical, top-down approach. This results in a lack of participation and stakeholder cooperation in forest-related planning processes and harms local stakeholders through inequitable distribution of forest benefits and the absence of a platform for prior and informed consultations. As to the rights of local communities to be involved in decisions related to forest management, the Association of Municipalities and Cities in BiH requested the Constitution Court

to decide whether the Law on Forests is harmonized with the European Charter of Local Self-Government. The court identified serious discrepancies between the law and the charter and ordered necessary alignments in terms of respecting the rights and vital interests of local communities. Since such alignments were not realised on time, the Law on Forests was proclaimed invalid. Although various institutions have proposed several drafts of a new Law on Forests, there is as yet no political agreement on this. The key point of disagreement is about the role of cantonal and local governments in terms of forest management. Moreover, the political crisis in BiH after the common elections in 2010 set this issue aside from general political debate, failing to observe negative impacts of that situation on SFM.

The issues of stakeholder participation and capacities to cooperate with public forest administration were also researched in the GOVOR project. It seems that forestry professionals in BiH still do not recognize the necessity to create and maintain partnership relations with other stakeholders in order to secure active participation of civil society as an important element of good forest governance (Mutabdžija, 2012).

7.4 Policy impact on sustainable forest management in BiH

Although some strategic documents (e.g. the National Environmental Action Plan) propose clear goals related to the forest sector, an overall commitment to SFM in BiH is at doubt. The issues related to the forest sector are only occasionally subjects of public political agendas (e.g. forest fires). As documented, forest policy does not exist, so processes related to SFM hardly can be evaluated as positive. The results of the GOVOR project emphasise a large gap between importance and implementation of forest-related policies and laws in the FBiH forest sector. Long-term societal commitment to SFM cannot be achieved without active and harmonized participation of all policy actors. This is particularly important in countries like BiH where the complicated constitutional system calls for close cooperation between different administrative levels.

The most important effort to address the issue of illegalities in the forest sector was the 2005 FBiH Action Plan to Combat Illegal Activities in Forestry and Wood-Processing Sectors. It was recognized that forest regulations alone cannot fully eliminate illegal activities. Thus, the action plan consists of three main lines: 1) improving external control (e.g. strengthening forestry inspection, independent assessment of type and volume of illegal logging, etc.), 2) internal development of public forestry companies (e.g. human resource development, application of market-oriented mechanisms for forming wood prices, etc.), and 3) parallel and supporting activities (e.g. formulation of the National Forest Program, promoting forest certification, etc.) (Government of the Federation of Bosnia and Herzegovina 2006). While significant improvements have been achieved in some aspects (e.g. forest certification), the majority of activities prescribed by the action plan are not yet implemented. Results of the GOVOR project related to forest-law enforcement in the national forest sector show that two-thirds of forestry professionals found this component poorly implemented though 90 percent of them found it very important. The GOVOR project found that the largest gap between what was important and what was implemented relates to measures to address corruption.

7.5 Influence of global initiatives on forest-related policies

Multiple international processes and initiatives to enhance sustainable use of forests strongly influence forest policy in BiH. Important activities for improving the state of the art in the national forest sector (e.g. development of the National Forest Program, combating illegal logging, etc.) have a clear aim to support implementation of various international processes focused on forest conservation at the national level. While it is clear that the strong drivers of change in the country originate from outside the forest sector, a more controversial issue is how these changes are perceived by key national forest policy actors and to what extent are the principles of global forest governance essentially adopted. Following this, one can evaluate the forest sector in BiH as having a resilient policy system that is quite resistant to the influence of international initiatives and processes. The formal commitment of the government to fulfil its international obligations stands, but practical implementation has not always led to SFM and positive changes in the national forest sector.

By analysing the case of the European Charter of Local Self-Government and the role of the FBiH Association of Municipalities and Cities in proclaiming the Law on Forests as invalid, one can understand how local implementation of international rules may influence national policies in a negative way. The result has been a four-year absence of the Law on Forests in FBiH, which has brought various negative consequences due to the non-existence of a sound legal framework. Furthermore, GOVOR project results prove that influence of internationally driven initiatives (e.g. good forest governance and associated principles) on the national forest sector and related policymaking processes are merely symbolic.

Of the international initiatives, forest certification has probably had the most important influence in BiH. Forest certification has become a solid self-sustainable instrument for increasing the competitiveness of forestry companies as well as an effective tool for successful public relations. According to the official data from the Forest Stewardship Council (FSC), more than 50 percent of all state forests in BiH are FSC certified (FSC 2012). Furthermore, several actions initiated by forest certification (e.g. establishing HCVFs, adopting a rule book for transparent distribution of timber) have led to better forest management. Unlike other pathways through which international processes may influence policies at national or local levels, forest certification is based on international market demands and relies on the final consumers values. Based on positive experiences with forest certification as a market-driven instrument, it is worth exploring the capacities of some legally binding instruments such as the EU Timber Regulation to support national forest policy development. Through different agencies and direct governmental agreements, the EU can offer a wide range of services (e.g. technical assistance, training, and capacity development, etc.) aimed at harmonization of the national forest sector with global forest-related processes. On the other hand, some sceptical opinions about the extent of the influence of global processes on national policy can hardly be neglected. Although the war in BiH was ended by direct foreign intervention, the role of external actors in national policymaking processes is a highly delicate matter. Almost two decades of

relatively slow economic and social progress show that direct and strong influence of international institutions (e.g. EU, United Nations, the World Bank, etc.) to national policy processes cannot be effective without an active role of domestic policy actors and wide national commitment to change social, political, and economic realities.

7.6 Summary

All countries in the Western Balkans face phenomena of countries in transition. This implies rapid changes in the political system, changing forest legislation and implementation, restitution and privatization of forest land. BiH is a special case in terms of forest policy and governance, which is largely related to a split in the entities, and the absence of an FBiH forest law compared to other countries in the Western Balkans. For private forest ownership, it is Albania and Serbia which have a significantly higher share of restituted private forest land.

The specific challenges for BiH are:

- Due to the unique constitutional set-up of BiH, there is neither a long-term forest development strategy, nor a consistent forest policy, nor a forest legislative framework at the state level. Forest policy is decentralized and designed by entities (RS and the FBiH) and Brčko DC. In the FBiH there is not even an FBiH Law on Forests;
- Current forest policies (entities, cantons) need more inclusive and participatory processes in order for those responsible for managing forest to understand what people want from forests, as well as the capacity of forest landscape to meet these demands;
- There are fundamental challenges for implementation of multifunctional sustainable forest management and forest governance which will be driven by demands of local communities, civil society, businesses and international organizations that are demanding and creating new approaches to making, implementing and enforcing forest policy;
- The importance of internationally accepted forest governance principles is widely recognized in forest sector of BiH, while their implementation in forest policy and forest management is recognized as one of the precondition for reaching SFM;
- The process of joining the EU is a significant driver of change in forest policy in BiH;
- Implementation of a restitution and denationalization processes will not dramatically affect the forest ownership pattern. A large proportion of forest land will remain controlled by public forest enterprises.
- The principles of forest governance are largely embedded into formal forest policy documents but they are still not part of forest management practice;
- Existing economic instruments of forest policy directed toward compensation of forest ecosystem services represent a solid basis for improvement of the overall condition of forests and could be used for financing rural development projects. This can only be realised if these economic instruments are properly used and factually returned to the forest sector. It can be used for financing rural development projects only if these projects contribute to improvement of forest conditions.

8. Level of attainment of relevant EU standards

8.1 Combating illegal logging

Illegal logging has been recognized as a serious problem for the BiH forest sector. Some international organizations (e.g. WWF) claim that BiH (together with other Eastern European countries) represent a major source of illegal or suspicious wood on the EU market. According to the WWF, the amount of illegally harvested wood from BiH has been estimated to be 1.2 million m^3 (WWF, 2008). On the other side, official data from domestic public authorities suggests much lower figures. For instance, the Ministry of agriculture, water management and forestry of the FBiH reported that only 38 603 m^3 of timber was illegally harvested in 2012, with total value of BAM 1 902 347 (Ministry of agriculture, water management and forestry of the FBiH, 2013).

In 2006, the Governments of both entities had recognized a need to adopt action plans to combat illegal activities in forestry and the wood-processing industry sector. These focused on improving external auditing procedures and developing internal capacities of forest management enterprises.

The main results of GovoR project identified Component 13: "Measures to address corruption" of FAMFG (the Framework for Assessing and Monitoring Forest Governance developed by FAO and PROFOR in 2011) as the most critical component of forest governance in the FBiH (Mutabdžija, 2013).

Recently, some cantonal forest management enterprises in the FBiH have developed their internal programs to prevent and combat corruption and illegal logging. These programs are mainly based upon the following pillars: formal commitment of company to prevent and combat with corruption; development and enforcement of internal structures within enterprises for prevention and combat with corruption; development and implementation of mechanisms and instruments for preventing and combating corruption and continuous education and dissemination of information on importance of prevention and combat with corruption.

8.2 EU Timber regulation

Wood processing industry in BiH is largely export oriented. According to the official statistics, the wood processing sector has positive trade balance and participates with 11.1 percent in total export of BiH – it has the highest surplus of Foreign Trade in BiH (Foreign Trade Chamber, 2011). Depending on types of wood products (primary processed or final wood products) most exports from the wood processing sector in BiH is oriented towards regional and EU markets such as Croatia, Serbia, Italy, Germany, Slovenia, Austria, France and Belgium. A new legislative framework related to import of wood products into the European Union – EU Regulation 995/2010 (EUTR) prohibits placing of illegally harvested timber and wood products on EU markets and request for application of Due Diligence Systems from all subjects in EU that place timber and wood products on market for the first time. This is a potential threat for export-oriented companies in the wood-processing sector due to the fact that BiH is internationally widely recognized as a country with a high level of corruption in forestry and wood processing

industry. Besides, most forestry professionals in BiH are not aware of the requirements of EUTR and the consequences which this EU Regulation could potentially have on forest and wood processing sector in BiH (Bećirović, 2013).

Although BiH is not EU member country, this regulation is very important for the national forest and wood processing sector. In order to better address and minimize potential threats to export-oriented wood-processing companies from BiH, the EUTR Action Plan for BiH was developed by experts from the Chair of Forest Economics, Policy and Organization (Faculty of Forestry, University of Sarajevo) with financial support of USAID – FIRMA project (Fostering Interventions for Rapid Market Advancement in BiH). EUTR Action Plan was developed with broad participation of the relevant stakeholders from forestry and wood-processing sectors in BiH, represented by 64 participants from public institutions and private companies. During the EUTR Conference that was organized on 22nd of January 2013, participants were firstly introduced to the basic aspects of the EUTR implementation process, its requirements and potential influences on BiH wood products export. During the Conference a round of discussion among participants was organized and draft version of EUTR Action Plan was compiled. The next step was the distribution of EUTR Action Plan to all relevant institutions and stakeholders for review, after which the final version of EUTR Action Plan was prepared and published in March of 2013.

The main activities within EUTR Action Plan for BiH are directed towards the promotion of responsible and legal utilization of forest resources and implementation of activities which could help export oriented companies to fulfil strict requirements of EUTR. The Action Plan has 17 inter-related activities that are directed toward establishment of preconditions for fulfilment of EUTR requirements and improvement of current situation in forestry and wood-processing industry. Among other, activities such as the improvement of the current level of knowledge regarding the EUTR requirements as concerns forestry and wood processing professionals were proposed, but also the distribution of information to the public when it comes to measures for the prevention of illegal activities and corruption in the forest sector. Intensifying efforts on adaptation of the Forest law in FBiH and the implementation of legislation in all areas of BiH were part of the Action Plan as well. Some of the activities were directed toward the analysis of possibilities for the initiation of a Voluntary Partnership Agreement process in BiH as well as the establishment of all preconditions related to CITES convention. One of the main pillars of Action Plans was a focus on improving human and institutional capacities in relevant institutions related to preventing and combating illegal activities in forestry. Furthermore, the support of the forest certification process and certification from wood processing companies are essential activities in this Action Plan. Establishing continuous communication and interaction between forest and wood processing enterprises and increasing transparency and accountability of forest management with strong support from civil society can lead to overcoming the export barriers for wood products from BiH.

Potential options for BiH forest and wood-processing sector to respond on EUTR requirements can be summarized as follows:

1. Certification (certificates for sustainable forest management as well as chain of custody) of all forest areas (regardless the ownership), with strengthening initiatives for development of the national forest certification standards that may be recognized by both, FSC and PEFC.
2. Full implementation of CITES, ratified in 2009.
3. Development of a national due diligence system (in compliance with EU standards) and connecting it with some operators (e.g. IKEA) or monitoring organizations from some relevant importing EU countries (e.g. Croatia, Italy, Slovenia, Austria and Germany)
4. Analysing potentials for establishing a Voluntary Partnership Agreement between BiH and the EU within FLEGT (Forest Law Enforcement, Governance and Trade) process.

The leadership on the above mentioned options should be given to the MoFTER, together with relevant entity ministries responsible on forestry activities and all other stakeholders with interests in combating illegal logging.

8.3 Phytosanitary standards

Phytosanitary aspects in forestry are prescribed by national forest legislation. As concerns forest reproductive material, the public forest administrations in both entities designate regions of provenance, select forest seed stands from which forest reproductive material should be provided, set up and maintain registers of the forest seed stands and authorize issuing certificates of origin. Seed extractors and tree nurseries keep track of the origin of the forest reproductive material and inform clients about the categories of forest reproduction material as well as its origin. The import of forest reproduction material is only possible based on authorization from public forest administration. The authorization shall only be granted if the forest reproduction material is of certified origin.

In FBiH, the FBiH Ministry of Agriculture, Water Management and Forestry adopted a Rulebook on Carrying Out Reporting and Forecasting Activities in Plant Health Protection on the basis of the Law on Plant Health Protection (Official Gazette of the FBiH no. 78/10) identifying the FBiH Forestry Administration as the central Reporting and Forecasting Service of the Federation (IPS FBiH) in the field of protection of forest plants and horticultural types of trees and shrubs, and cantonal forestry administrations as competent for reporting and forecasting activities in the cantons.

Within the Ministry of Foreign Trade and Economic Relations (MOFTER) there is state-level public Administration that deals with plant health protection. Several subordinate pieces of legislation relevant for forest sector and wood-based industry are adopted by this Administration in order to have national legislation harmonized with EU legal heritage or international conventions, presented in the following table:

National subordinate legislation	EU/international legislation as base for harmonization
Law on health protection of plants	IPPC (International Plant Protection Convention)
Rulebook on list of harmful organisms, list of plants, plants products, and regulated objects	Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community Commission Directive 2009/7/EC amending Annexes I, II, IV and V to Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community
Rulebook on measures to prevent introduction, spread and control of harmful organisms to plants and plant products regulated facilities	Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community
Rulebook on phytosanitary requirements for wood packaging material in international trade	Commission Directive 2004/102/EC amending Annexes II, III, IV and V to Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community Commission Directive 2008/109/EC FAO International Standards for Phytosanitary Measures No.15 Guidelines for regulating wood packaging material in international trade

Source: (http://www.uzzb.gov.ba/www/index.php?option=com_phocadownload&view=sections&Itemid=9&lang=bs)

8.4 Product standards

The study "Transition from JUS to BAS EN standards for forest timber assortments in Bosnia-Herzegovina" was prepared in 2012 by a team of domestic and regional experts engaged by the partners of the *Fostering Interventions for Rapid Market Advancement* in BiH (FIRMA) Project. This project is financed by the United States Agency for International Development (USAID) and the Swedish International Development Cooperation Agency (Sida). The study provides an expert opinion on different forestry standardization systems, individual standards and the positive and negative experiences related to their immediate application in a number of countries and suggestions on how to enable the efficient and functional application of the (BAS) EN standard within the forestry and wood processing industry in Bosnia and Herzegovina. An analysis of the present standard (JUS) in Bosnia and Herzegovina revealed that it is more orientated towards a centrally planned economy and therefore less responsive to present market conditions in the forestry and wood processing industry. In order to simplify and gain unobstructed access to a unique European market Bosnia and Herzegovina has taken the decision to adopt and apply the EN standard as the national standard and therefore introduce appropriate instruments (standards) for the production of and trading in round wood. The Institute for Standardization in BiH has accepted and adopted 24 of the EN standards in this field and marked them as BiH national standards: BAS EN.

Comparative analysis revealed that when compared to JUS the BAS EN standard is more precise and better suited to present market conditions and the existing technology and methods for wood processing and usage in BiH. It is expected that this change in standards will lead to a corresponding change in the planning and operation of forest management and wood processing industry enterprises.

Research conducted into forest management and wood processing industry enterprises confirmed the dysfunctional nature of JUS in relation to a range of products and the lack of conformity of the present system in terms of measuring dimensions and calculating volumes; one example being the non-existence of price classes that respect round wood dimensions. The surveyed enterprises expressed their willingness to introduce and consistently apply the EN standards within the domestic standardization system. However, they expressed their opinion that prior to the immediate application of the new standards it will be necessary to create and pass the appropriate law and regulations. In addition, certain technical aspects related to planning have to be addressed; this primarily concerns the correction of tree classifications, the creation of assortment tables and the provision of adequate training for employees both in the theoretical and practical sense (Source: FIRMA 2012. Transition from JUS to BAS EN standards for forest timber assortments in Bosnia and Herzegovina, Final report, Sarajevo.).

8.5 Production of seed and seedlings

The production of seed and seedlings is important activity in BiH forestry, traditionally organized and controlled by public forest companies. From a legislative point of view, the production of seeds and seedlings is regulated at entity level. Both entities have adopted legislative frameworks that regulate the production and commercialization of seeds and seedlings at the territory of BiH as well as imports from other countries. According to the Law on forest reproductive material in RS,[24] the import of seeds and seedlings is allowed if the importing material is produced in accordance with the EU standards (Article 9). The same holds true for the FBiH. By Article 30 of the Law on seeds and seedlings, the import of seeds and seedlings of tree and shrubs species used for forestry and horticulture purposes[25] must be approved by responsible institution in the FBiH while their quality has to be in accordance with national standards.

The production of seeds is traditionally organized in specially designated forest stands, officially entitled “seeds objects”. These forest stands are specific in their phenotype, health and quality of tree species and are marked in the field and managed by special management plans that are developed by responsible forest management companies. According to Article 9 of the Law on seeds and seedlings, production of tree and shrubs species for forestry and horticulture production in the FBiH can be organized only by a legal person inscribed in the Register of seed producers. This register is developed by FBiH ministry for agriculture, water management and forestry while its maintenance is entrusted to the FBiH forest office. Official data for the territory of FBiH indicates that three legal persons are inscribed in the register of seed producers,

24 Official gazette of the RS, No 70/09
25 Official gazette of the Federation of BiH, No 71/05

while the total number of registered seeds objects is 73. The quantity of produced seeds in the FBiH for 2012 was 1 527kg[26].

The organizational structure of seed production is similar in RS. The Ministry for Agriculture, Forestry and Water Management establishes and maintains the register of seed objects and nurseries. Producers are responsible for keeping records of all quantities of produced seeds. Furthermore, the cadastre of forests and forest land in RS contains information about seed objects such as date of their establishment, main tree species, exact location and area of seeds objects. According to the cadastre, 54 seeds objects are registered at the territory of the RS covering an area of 1 136.76 ha[27]. Produced seeds are mainly used for nursery production within organizational units of public companies responsible for forest management in different areas of BiH.

The production of seedlings in nurseries in the BiH is also regulated at the entities level and corresponds to the same legislative framework as production of seeds. In case of the FBiH, seedlings producers need to be inscribed in the register in order to be legitimate. Such register is maintained by the FBiH forest office. The production of seedlings has to be controlled by an authorized institution at least twice per year. Currently, the Faculty of Forestry in Sarajevo is the only authorized institution for control of seedlings production in the FBiH, while eight legal persons are registered for nursery production. The producers of seedlings are obliged to send reports on the number of produced, sold and destroyed seedlings to the FBiH forest office at least once a year. The official data indicates that 16 nurseries are registered in the territory of the FBiH. The production in 2012 was above 8 million seedlings, mainly spruce and pines (88 percent).

Nursery production in RS is organized as business unit of public company "Šume RS", which has nine nurseries. According to the cadastre of forests and forest land in RS, the total area dedicated to the nursery production is approximately 147 ha. The total production in 2013 was around 5.8 million of seedlings, with highest share of spruce and pines (76 percent). The Law on forest reproductive material in RS prescribes that quality control of the produced seedlings have to be performed either by public company responsible for forest management (Šume RS) or other legal persons that comply with the Law (Article 26).

Produced seedlings are mainly used for afforestation which is realised in accordance with the silvicultural management plans prepared by public companies responsible for forest management. Current capacities for the production of forest reproductive material in BiH are harmonized with domestic market requirements, especially those of public companies responsible for forest management. In terms of diversifying the offer that would attract broader spectrum of buyers, significant efforts on improving technical capacities, investments in machinery and marketing activities have to be undertaken. On the other side, national legislation regarding seeds and seedlings needs to be harmonized with EU legislative framework in order to enable export of reproductive material.

26 Annual information on forest management and management plans in the Federation BiH (2013), Ministry of Agriculture Water management and Forestry, pp. 50-52.

27 The Cadastre of forests and forest lands in Republika Srpska (2013), PC Šume Republike Srpske, pp. 1-13.

This entails in particular

- The EU Regulation on Format of national lists of the basic material of forest reproductive material (2002);
- The EU Regulation on Definition of small quantities of seed (2002);
- The EU Regulation on Authorization of a Member State to prohibit the marketing of specified forest reproductive material to the end-use (2002);
- The EU Regulation on Marketing of forest reproductive material derived from certain basic material (2004);
- The EU Decision on Equivalence of forest reproductive material produced in third countries (2008);
- The EU Decision on Releasing Member States from the obligation to apply certain Directives on the marketing of fodder plant seed, cereal seed, material for the vegetative propagation of the vine, forest reproductive material, beet seed, vegetable seed [...] (2010);
- The EU Decision on Amending Council Decision 2008/971/EC to include forest reproductive material of the 'qualified' category and to update the name of the authorities responsible for the approval and control of the production (2012);
- The EU Directive on Implementing Directive on protective measures against the introduction into the Community of organisms harmful to plants or plant products.

All of these aspects of compliance with EU law have to further investigated for the case of BiH. Strong collaboration with the EC Expert group on legislation on seeds and plant propagating material and the Standing Committee on Seeds and Propagating Material for Agricultural, Horticultural and Forestry is recommended.

8.6 Summary

In 2003, the EU declared that the future of the Balkans is within the European Union. The declaration contained a conditional promise. The EU would consider the Western Balkan states for membership, but only if they achieved EU standards. Since then, progress towards EU accession has developed heterogeneously and slowly. Tangible results from experience made in Croatia since accession in 2013 are scarce, but could serve as best reference for these aspects in BiH. What can already be seen is that the human resources for implementing EU policies and participating in the EU political process is the main bottleneck for successful compliance. This can be seen as a main challenge for BiH for the attainment of relevant EU standards as well.

In this study, the following issues were highlighted:

- Combating illegal logging is one of the predominant objectives for RD. This goes hand in hand with fighting corruption, better presence of controlling, and awareness-raising among the population;
- The new EU Timber Regulation imposes severe changes onto the forest-based sector in BiH. Installing institutional structures for certification of and collaboration with the sector is essential to guarantee business development with the EU both in the private and corporate sector;
- Adjusting national standards with EU standards is a mandatory preparatory step for EU accession and shall be spread to the national forest-based sector stakeholders accordingly.
- Harmonization of seed and seedling production with EU law on reproductive material and trade to support export from BiH to the EU.

9. Qualifications and education

9.1 Forest education schemes

9.1.1 Secondary

During the school year 2012–2013, 1 304 students were enrolled in forestry and wood-processing secondary schools in RS, 1 052 of whom male and 252 were female (Institute for statistics of RS, 2013). There are nine forestry and wood-processing secondary schools in RS (Forest Development Strategy of RS for 2011–2021, 2012). These schools educate forestry technicians and wood-processing technicians.

As one of the principles of Forest Development Strategy of RS, the need for improving the quality of education, training, information, staffing and research (principle 7 of the Strategy) had been recognized. Criteria of this principle are as follows:

1. It is necessary to train scientists in research of total and specific potentials of forest ecosystems that goes in line with multifunctional usage of forest resources;
2. It is necessary to build permanent capacities of educational and scientific-research system in field of forestry in RS capable for networking with different interest groups, international institutions and related sectors;
3. It is necessary to establish dynamical educational system, based on long-term research activities and stable financial support;
4. Development of science-industry cooperation by assuring applicability of scientific projects, participation of professionals employed in forestry enterprises in research teams, continuous specialization of forestry experts and financing of scientific work;
5. Development and encouragement of international cooperation and participation in international scientific projects;
6. Assuring scholarships and employment of talented and extraordinary pupils and students;
7. Preparation and implementation of long life learning programs for employees and increase of capacities of professionals through education and training;
8. Development of informational system for forest sector in RS.

In the same school year (2012–2013) in the FBiH, 1 712 students were enrolled in forestry and wood-processing industry secondary schools (Institute for statistics of the FBiH, 2013). 1 135 of whom were male and 577 were female students (Institute for statistics of the FBiH, 2013). There are six forestry and wood-processing secondary schools in the FBiH (Čabaravdić et al, 2011).

There is no official data on lecturers that teach forestry courses in secondary schools in the FBiH. According to the in-depth interviews, in school year 2010–2011 there were 57 teachers of forestry courses (Čabaravdić et al, 2011). Seventy percent of the teachers in forestry-related secondary schools in the FBiH were female while 30 percent were male. The reasons for such gender distribution are manifold. They mainly refer to the working conditions and type of working activities in cantonal public forest enterprises. Job activities in forestry enterprises are mainly related to the field work which is mostly preferred by males (Čabaravdić et al, 2011). In case of Secondary school for environment and wood design in Sarajevo, courses on general education (such as Bosnian/Croatian

language, foreign language, maths, PE, informatics, civic education, history, biology, chemistry and physics) have been lectured by 36 teachers. Professional subjects (forestry subjects) have been lectured by 19 teachers, engineers of forestry, and two teachers responsible for practical classes (Čabaravdić et al, 2011). Practical classes had been organized in cooperation with Cantonal public forest enterprise and Public Utility Company "Park". In other Cantons, teaching process has been implemented in classrooms mainly with insufficient number of practical classes. Practical classes have been organized in cooperation with public enterprises. Still, there is no information on technical capacities of forestry-related secondary schools in the FBiH. In case of the abovementioned school in Sarajevo, in school year 2010/2011 this school had four classes of forestry technicians, four classes of horticulture technicians, four classes of ecology technicians, three classes of forest and hunting rangers and one class of technicians for nursery production (Čabaravdić et al, 2011).

According to the results of in-depth interviews conducted for the purpose of the above-mentioned study (Čabaravdić et al, 2011), interviewed representatives of forestry enterprises express the need for more professionals educated as operators of forestry mechanization. Assessment of level of knowledge of new generations of educated technicians has been different. Most of the representatives pointed out the lack of practical knowledge of newly educated stuff and their ability to implement such a kind of knowledge in field work (Čabaravdić et al, 2011). The implementation of three curricula in forestry-related secondary schools in the FBiH is an aggravating circumstance in improving the situation. These are as follows: EUVET (European Union Vocational Education and Training), Croatian curricula and standard national curricula for this type of schools (Čabaravdić et al, 2011). These curricula are mainly compatible with regional ones. Differences in curricula are an outcome of different educational policies whose formulation and implementation are under the jurisdiction of the Cantons. Therefore, choosing curricula represents fulfilment of specific requirements in each Canton (Čabaravdić et al, 2011). Unlike other two curricula, EUVET favours equal amounts of theoretical and practical teaching. According to the results of the analysis of curricula and quality of their implementation, conducted for the purpose of abovementioned study, there are significant differences in their quality. These differences are particularly related to the quality of practical classes. Curricula of both practical classes and general education are too ambitious while in case of practical classes – it is difficult to implement (Čabaravdić et al, 2011). There is a need for harmonization of curricula with realistic possibilities of their realization that can be sufficiently realized by implementation of EUVET program (Čabaravdić et al, 2011). Implementation of EUVET program, that is compatible with European curricula, should ensure creation of common curricula in the FBiH with particular focus on realization of practical classes (Čabaravdić et al, 2011). Since the organizational solution and curricula of forestry secondary schools represent platform for both, professional work in forestry enterprises and continuation of education, achievement of such various goals demands for harmonization of curricula in the FBiH to the extent possible by assuring their comprehensiveness and respecting specific needs of local communities (Čabaravdić et al, 2011).

9.1.2 Tertiary

Currently, the tertiary forestry education in BiH is organized at four universities, namely the University of Sarajevo, the University of Banja Luka, the University of East Sarajevo and the University of Bihać. Forestry study at the University of East Sarajevo is organized within the Agricultural Faculty in Vlasenica (RS). The forestry study at the University of Bihać is organized within the Biotechnical faculty in Bihać (FBiH). The forestry study in Vlasenica and Bihać just started 2-3 years ago and it is still too early to evaluate their impact on overall forest education situation in BiH.

Faculty of Forestry in Banja Luka

The Faculty of Forestry University of Banja Luka was established in 1992 while the teaching process started in the 1993-94 school year. The teaching process was based on curricula from Faculties of Forestry in Sarajevo and Belgrade. In 2013, the faculty had 40 employees out of which 25 were teaching staff. There were five full professors, two associate professors, six assistant professors and 12 senior teaching assistants. A significant portion of teaching activities are done by teaching staff permanently employed at the Faculty of Forestry University of Belgrade. Starting from its establishment until the beginning 2013-2014 school year, more than 2 000 students have been enrolled at the faculty while 531 students had successfully accomplished their studies (Čomić, 2013).

The faculty has eight academic chairs, namely ecology of forest ecosystems, forest genetics and afforestation, integral protection of forest ecosystems, forest utilization, organization and forest economics, silviculture, forest management planning and game management. There are undergraduate studies organized by a department of forestry, and two graduate programs: “Forest management based on close-to-nature principles” and “Forestry” (Faculty of Forestry University in Banja Luka, 2014).

Since 2007-2008, the educational process at the faculty is organized by respecting the Bologna principles. In period 2007-2013 the teaching process was organized on the following way: Three years (six semesters) of undergraduate studies, plus two years of graduate studies (four semesters), plus three years of PhD studies. Starting from 2013, the teaching process is organized as 4 years of undergraduate studies, plus one year of graduate studies, plus three years of PhD studies.

Since 2007-2008, education in this faculty has been organized by respecting the Bologna principles. The faculty of the Forestry University of Banja Luka is part of a network of research institutions in the field of forest policy and economics under the auspices of EFI-FOPER. Since 2008, the faculty has been a member of international consortium of forest faculties from South-East Europe (COPPFORSEE) whose main goal is to deal with issues surrounding managing coppice forests in this part of Europe. The lack of an institute for forestry, game management and wood-processing industry decreases the potential for improving research activities.

Faculty of Forestry in Sarajevo

The Faculty of Forestry University of Sarajevo had been established as a department of Agricultural faculty in 1948. Teaching process at this faculty had started in 1949.

The management body of the faculty consists of the Dean and three vice deans: for teaching process, for finances and research activities and for international cooperation. The faculty is organized around five chairs: the Chair for ecology of forests and urban greenery, the Chair for forest silviculture and urban greenery, the Chair for forest protection and urban greenery, the Chair for forest utilization, designing and construction in forestry and urban greenery and the Chair for economic, policy and organization of forestry and urban greenery. Recently, the faculty established the Institute for forestry and horticulture. The faculty has three teaching facilities: Čavle at Igman mountain near Sarajevo and two arboretums. Currently, the faculty has four full professors, 10 associate professors, nine assistant professors and six senior teaching assistants.

Undergraduate study at the Faculty of Forestry in Sarajevo is organized on the principles of the Bologna system. Since undergraduate study has six semesters, the BSc. diploma has 180 ECTS. After finalization of BSc studies, students receive a Bachelor's degree in forestry or horticulture (depending on the department which the students choose to attend). Graduate studies (MSc. studies) on both departments of forestry and horticulture have a goal of educating students that have balanced knowledge in general, ecological, technical and policy-economic disciplines. After finalizing MSc studies, experts of this profile have enough knowledge to be able to understand, design and realize various kinds of projects in forestry, horticulture and related sectors (Faculty of Forestry University in Sarajevo, 2014)

Starting from this school year (2013-2014), Faculty of Forestry in Sarajevo begun with organization of PhD studies according to the Bologna principles. First generation of PhD students has nine candidates.

Until 2008, before starting the implementation of Bologna principles, 2 075 students finished Faculty of Forestry in Sarajevo, 54 candidates gained Master of Science degrees (mr.sc.) while 42 candidates gained PhD degrees. These numbers are larger bearing in mind that some students graduated under the pre-Bologna teaching program even after 2008. By introducing Bologna principles at the Faculty of Forestry in Sarajevo, undergraduate and graduate studies have successfully been accomplished by some hundreds of students (BSc and MSc of forestry/horticulture) (Čabaravdić et al, 2011).

As a part of abovementioned study (Čabaravdić et al, 2011), research on perception of the level of applicability of knowledge gained in forestry-related educational institutions in the FBiH has been conducted. Common attitude of all respondents is that practical training at both secondary schools and faculty is missing. As one of the mostly pronounced recommendations for the improvement of curricula, respondents recommended inclusion of practical courses as well as participation of forestry professionals with field experience in the teaching process (Čabaravdić et al, 2011). Particular attention had been given on need for affirmation of practical courses as effective tool for overcoming lack of one of the most pronounced shortcomings of forestry professionals in the FBiH – insufficient knowledge on socio-political and economic aspects of forest management (Čabaravdić et al, 2011). As a consequence, forestry professionals are seen as "experts for utilization of forests" not experts for

multifunctional management of forests (Čabaravdić et al, 2011).

Based on the conducted interviews, following key problems in forestry education system in the FBiH can be identified (Čabaravdić et al, 2011):

- A common problem in the education system of forest sector in the FBiH is disorganized educational systems particularly in case of secondary education;
- Education of forestry professionals has no appropriate position which corresponds to the importance of forest sector in the FBiH;
- Actual concept of secondary education is dysfunctional and inefficient;
- Cooperation of educational institution and forest management enterprises is not at appropriate level;
- Valorisation of work in educational institutions is not adequate, which is also one of the crucial problems in functioning of educational systems;
- The level of practical trainings and courses both at secondary and tertiary educational levels is not enough.

9.2 Post-educational trainings and qualification instruments

Within the abovementioned study on quality of education in forest sector of the FBiH (Čabaravdić et al, 2011), analysis of financial allocation of forest management enterprises and cantonal and FBiH forest administration offices for post-educational professional trainings of their employees had been conducted. For the purpose of this analysis, following data was collected:

- Operational costs, budgets of public institutions (cantonal offices and FBiH office for forestry, inspection offices);
- Number of employees in forestry enterprises and forestry administration;
- Financial allocation for professional trainings of employees.

The following findings were revealed. The average operational costs for the period 2006-2008 of all cantonal forest management enterprises were BAM 168 944 962. The average number of employees for the same period is 4 377. The average amount of money which was spent on the education of employees is BAM 151 415. The biggest amount of money was spent in cantonal forest enterprise in Unsko-Sanski Canton; BAM 111 482 while in five cantons (Posavski, Zeničko-dobojski, Hercegovačko-neretvanski, Zapadnohercegovački and Canton 10) there were no such investments at all. The average amount of money that was spent on education per one employee was BAM 34.78. The largest amount of money per employee allocated for education was in Unsko-Sanski Canton (BAM 174.01 per employee). Out of total costs of enterprises, average percent of money that was spend for education of employees (period 2006–2008) was 0.09 percent. The biggest percentage was in Unsko-Sanski canton – 0.32 percent.

When it comes to the forestry administration institutions, following conclusions can be driven. The average budget of all cantonal forest offices for period 2006–2008 was BAM 10 474 622 (the biggest budget was in Srednjobosanski Canton – BAM 2 606 719 while there were no investments in cantonal forest offices in Hercegovačko-neretvanski, Zapadnohercegovački and Canton 10). The average number of employees in all cantonal forest offices was 251 (the biggest number of employees was in Zeničko-dobojski canton

- 78 while only one person was employed in cantonal forest offices of Posavski and Hercegovačko-neretvanski Canton). The average amount of money which was spent on education of employees was BAM 14 665 (the biggest amount of money was allocated in cantonal forest office of Srednjobosanski canton). The average amount of money that was spent on education per one employee was BAM 57.27. The biggest amount of money per employee allocated for education was in cantonal forest office in Zeničko-dobojski Canton – BAM 130 per employee. Out of total costs of cantonal forests offices, for period 2007-2008, 0.14 percent of total costs were spent for education of employees in all forest administration offices on average. The biggest percentage was in Zeničko-dobojski Canton – 0.52 percent.

This analysis revealed various attitudes of forestry institutions regarding additional professional trainings of their employees. There is interest of employees for further professional (post-educational) trainings. Such activities should be implemented in each enterprise and forest administration office through internal educational programs, education related to the specific forestry-related issues (Čabarabdić et al, 2011).

9.3 International education programmes

The Western Balkan region is known for its rich natural forests, but in its long history of forest management, it has nonetheless lacked the capacity to tackle the forestry issues outside the forest – in political agendas, market economics, and civil society. Therefore, the need to strengthen capacities for research activities in forest policy and economics had been recognized by European Research Institute while Finnish Ministry of Foreign Affairs decided to finance this project. FOPER project had two phases - FOPER I - Strengthening Capacities of Education and Training for Forest Policy and Economics Development in Western Balkan Region in period 2004-2009 and FOPER II - Consolidation of the Human Capacities in Forest Policy and Economics Education and Research in South-East Europe (2009-2013). Both were designed to create human capacity in Western Balkan region in order to bring forestry to political agenda by implementing policy relevant research and increasing higher education capacity. The following organizations in the Western Balkan region are or have participated in the project as full partners:

- Croatian Forest Research Institute, Jastrebarsko, Croatia;
- Faculty of Forestry, Zagreb, Croatia (2004-2006);
- University of Belgrade, Faculty of Forestry, Belgrade, Serbia;
- Institute of Forestry, Belgrade, Serbia;
- Forest and Pasture Research Institute, Tirana (later Agency), Albania (2004-2011);
- Agricultural University of Tirana, Faculty of Forestry Sciences, Tirana, Albania;
- University of Sarajevo, Faculty of Forestry, Sarajevo, Bosnia and Herzegovina;
- University of Banja Luka, Faculty of Forestry, Banja Luka, Bosnia and Herzegovina;
- Ss. Cyril and Methodius University, Faculty of Forestry, Skopje, Macedonia;
- Institute of Lowland Forestry and Environment, Novi Sad, Serbia.

To achieve its goals, FOPER designed several capacity building frameworks each filled with innovative approaches. During the first part of the project, the main goal was to strengthen human capacities. During this period, FOPER designed and implemented a brand new

International Master Program in Forest Policy and Economics (MSc FOPER), Professional Training in Forest Policy and Economics, and research focused on the Science Policy Interface. In the second phase, the project focused on consolidation of these gains and the components included: the second generation of the International Master Program in Forest Policy and Economics, increased training of university teachers, expanded training for regional researchers, the creation of six Collaborative Regional Research Teams, and a Doctoral College to support FOPER MSc students working on a doctoral degree. The FOPER International MSc Program has enrolled 45 students in two generations. Over 85 percent of students from the first generation are employed or continuing their education. Around three quarters of the 21 students from the second generation have successfully defended their thesis.

FOPER II began with the Forest Governance, Policy and Economics Research Agenda for Western Balkan region developed under FOPER I by the stakeholders around the region. The team identified the top 20 critical research topics and framed them into six regional research projects as the basis for organizing Collaborative Regional Research Teams (CRRT). Each CRRT is coordinated by regional FOPER Focal Point.[28]

9.4 Research in the forest sector

According to the information that was possible to collect for the purpose of the study on education within Forestry Development Program of the FBiH, total amount of funding by public forest administration in the FBiH for period 2000–2009 were 2 086 334.29 KM (Čabaravdić et al, 2011). Allocation of funds for research has begun in 2002 while its continuous allocation has been established since 2003. FBiH office for forestry within FBiH ministry for agriculture, water management and forestry had developed mechanism for continuous funding of research projects while other administrative institutions are financing research on periodically. Research areas that were in focus of funding in the period 2000–2009 are: silviculture, forest protection, analysis of forest biodiversity, forest genetics, forest policy and economics, forest management planning (Čabaravdić et al, 2011).

In total, 13 institutions have been identified as funders of research projects in forestry (Čabaravdić et al, 2011) which are implemented by the Faculty of Forestry. Yet, some of these institutions have been interested in financing issues related to issues on day-to-day forest management practice not for research activities. Institutions that funded research activities only are as follows: FBiH ministry of education and science, Ministry of education and science of Sarajevo Canton and FBiH office for forestry. Only four cantons allocated funds for scientific purposes in the period 2000–2009 (Tuzlanski Canton, Canton Sarajevo, Unsko-sanski Canton and Zeničko-dobojski Canton). The largest amount of funds allocated for research activities were allocated by FBiH office for forestry (BAM 1 166 887) (Čabaravdić et al, 2011).

Due to the lack of indicators and lack of monitoring systems for evaluation of project implementation, it is hard to rate level of applicability of conducted research projects (Čabaravdić et al, 2011). General observation is

28 More on FOPER: http://www.efi.int/files/attachments/reports/full_story_of_foper.pdf

that level of their applicability is relatively low due to the fact that lot of funded projects were not directed toward their applicability only. It is without doubt that searching for additional funding opportunities in imperative for forest research in BiH for responding to new problems in forest sector, but also increase international research competiveness by increasing records of international cooperation.

9.5 Summary

The challenges for education and training are very similar all over the Western Balkan region, essentially a lack of resources and human resources. Activities such as the FOPER programme, that ties institutions from different countries together, may be essential for the management of scarcity and unravelling of synergies and cooperation in the region.

For BiH the main findings are:

- Importance and changes in role of forest sector in rural development is not adequately emphasized by current educational systems of forest sector in BiH;
- Practical training, as mechanism for linking educational programs with current issues in forestry-related topics, both at secondary schools and faculties in BiH is weak;
- Lack of knowledge in socio-political and economic aspects of natural resource management is significant shortcoming of forestry professionals in BiH;
- Cooperation of secondary and higher education institutions and forest management enterprises is not sufficient;
- Allocation of funds for research in forestry is insufficient and unequally distributed;
- Financing of post-educational (continuous) trainings in forestry is insufficient and vary from one institution to another;
- For those post-educational (continuous) trainings that have been provided, skills and competences on socio-economic and policy aspects of rural development and their implications on forest sector are not sufficiently provided.

10. SWOT analysis

10.1 SWOT workshops

To judge the situation of the forest based-sector utilising a participatory SWOT analysis (strengths, weaknesses, opportunities and threats) was performed. A SWOT represents a systematic thinking and comprehensive diagnosis of factors relating to a new product, technology, management, or planning; and includes both, internal factors (strength and weakness) and external factors (opportunities and threats). The influence of an internal factor entirely derives from the study object, whereas external factors originate from the outside the object and can either be positive (opportunities) or negative (threats).

For this purpose, two stakeholder workshops were held to perform a participatory SWOT analysis, one in RS, one in the FBiH. The workshop in RS was held on 16 June in Sipovo welcoming 13 participants, the one for FBiH was held in Zenica on 17 June involving 21 participants.

The procedure was as such that participants were introduced to the sector study, its objectives and the links to rural development. The actual SWOT exercises were facilitated with the World Café method that splits the group into thematic tables and lets them discuss the particular features of strengths, weaknesses, opportunities, threats with regard to the forest-bases sector in the context of rural development. The discussions were document in a flip chart mapping and presented to the entire crowd after the World Café.

In a second step, participants were asked to prioritize what they consider the most important issues after our discussions. Each participant received five stickers and was requested to pin them freely across the four thematic sheets.

10.2 SWOT results

Results of the workshops are highlighted as regards their thematic clusters. From the SWOT workshops, there is a thematic chart for each thematic cluster (see figures 10.1-10.8.). These charts show all identified topics and also the priorities addressed to them by the participants. The number of yellow boxes in the charts indicates the number of votes given by participants for each topic during the prioritization exercise.

10.2.1 Strengths

Fig. 10.1 Strength map for RS

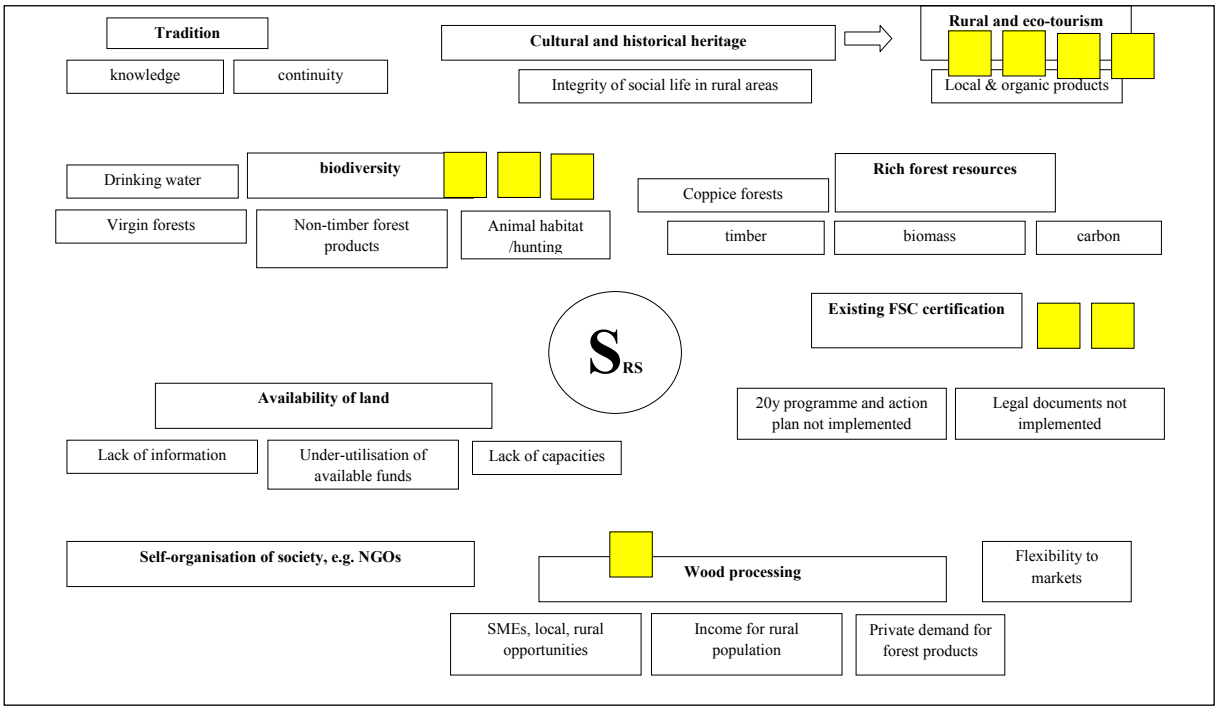
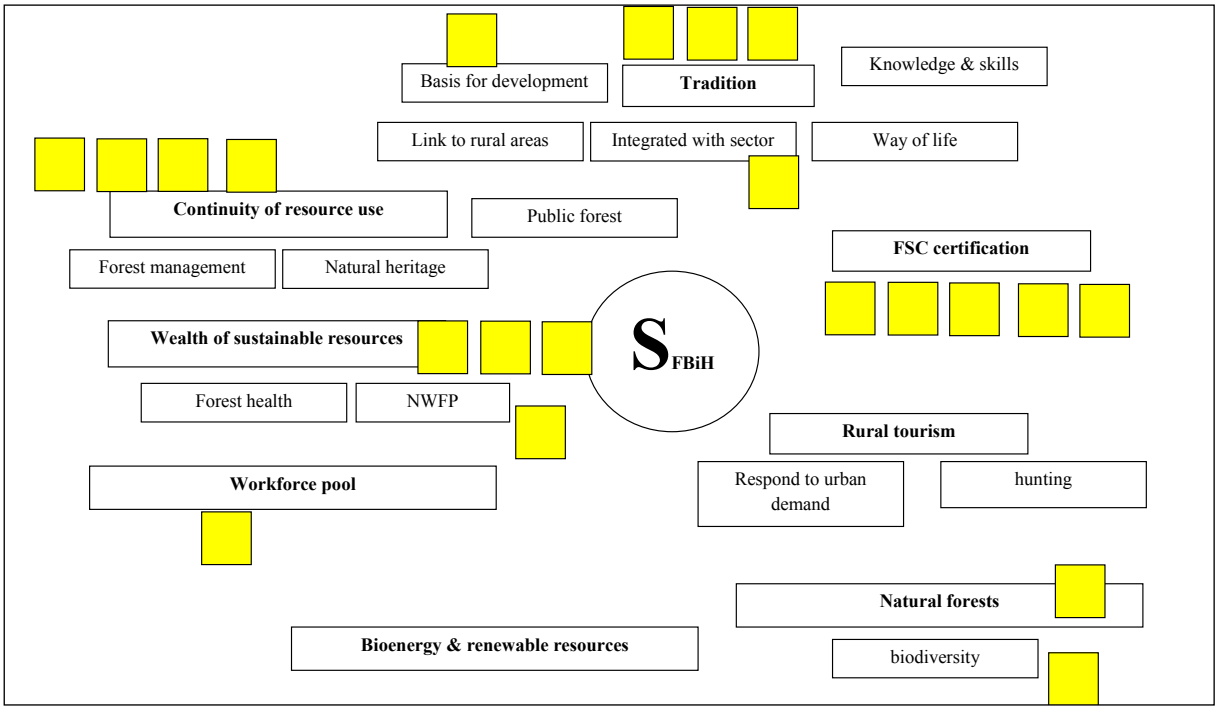


Fig. 10.2 Strength map for FBiH



The three top strengths identified by the workshop participants are:

RS	FBiH
• Rural and eco-tourism	• FSC certification
• Biodiversity resources	• Continuity of resources
• FSC certification	• Tradition

Both workshops demonstrated a very traditional forestry perspective where continuity and tradition go alongside natural and cultural heritage as the main assets and preconditions for further rural development.

10.2.2 Weaknesses

Fig. 10.3 Weakness map for RS

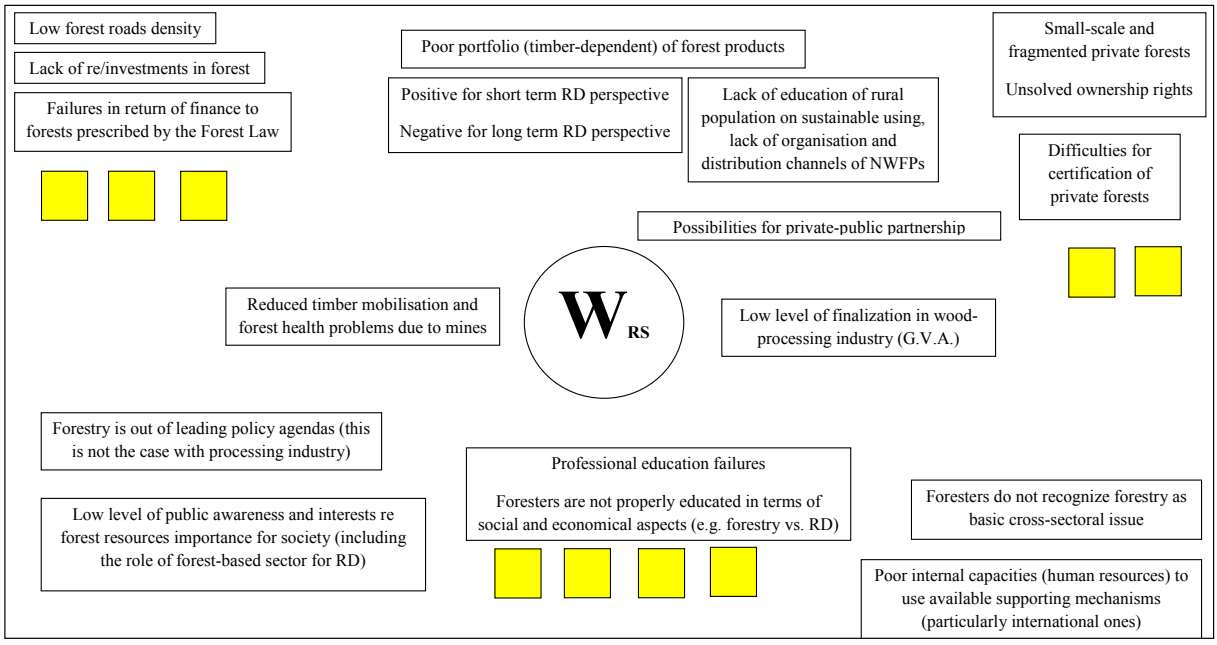
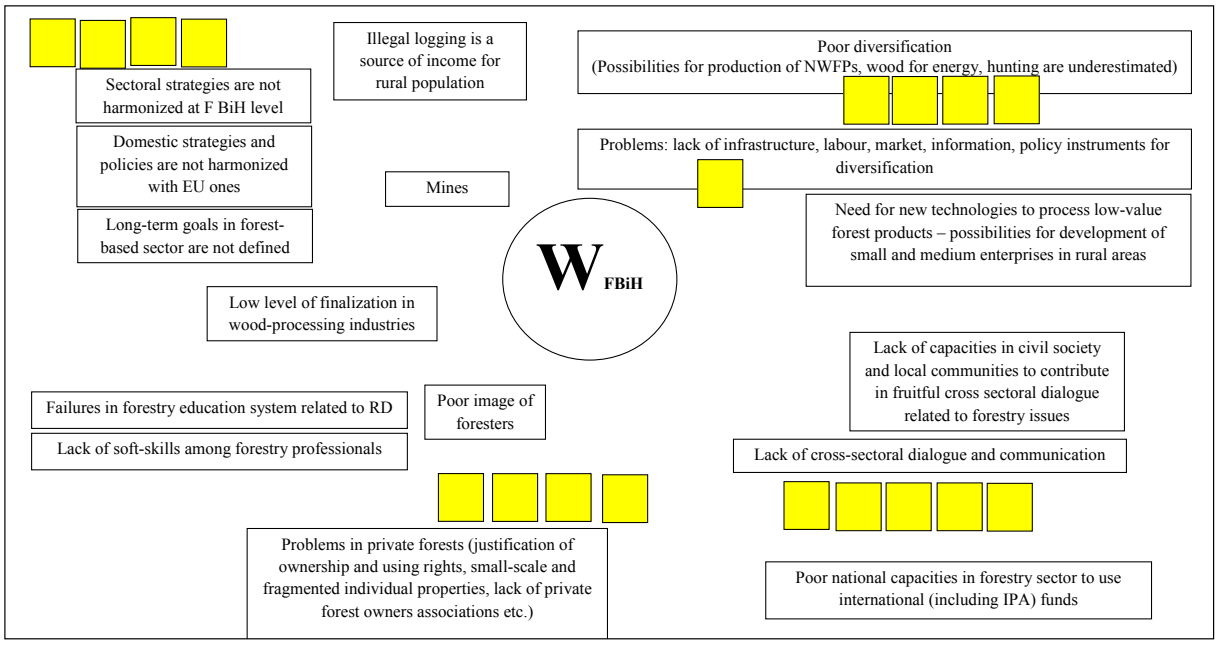


Fig. 10.4 Weakness map for FBiH



The three top weaknesses identified by the workshop participants are:

RS	FBiH
• Professional education	• Lack of cross-sectoral communication
• Re-investment into forestry	• Poor product diversification
• Lacking certification for private forests	• No harmonization of sectoral strategies • Problems in private forests

In the category of weaknesses, there are considerable differences as regards the votes of stakeholders. While in RS the lack of financial and human resources plays a major role, in FBiH it is the lacking political and strategic vision that is perceived as hampering. In both entities, the situation of private forests is considered as considerable weakness.

10.2.3 Opportunities

Fig. 10.5 Opportunity map for RS

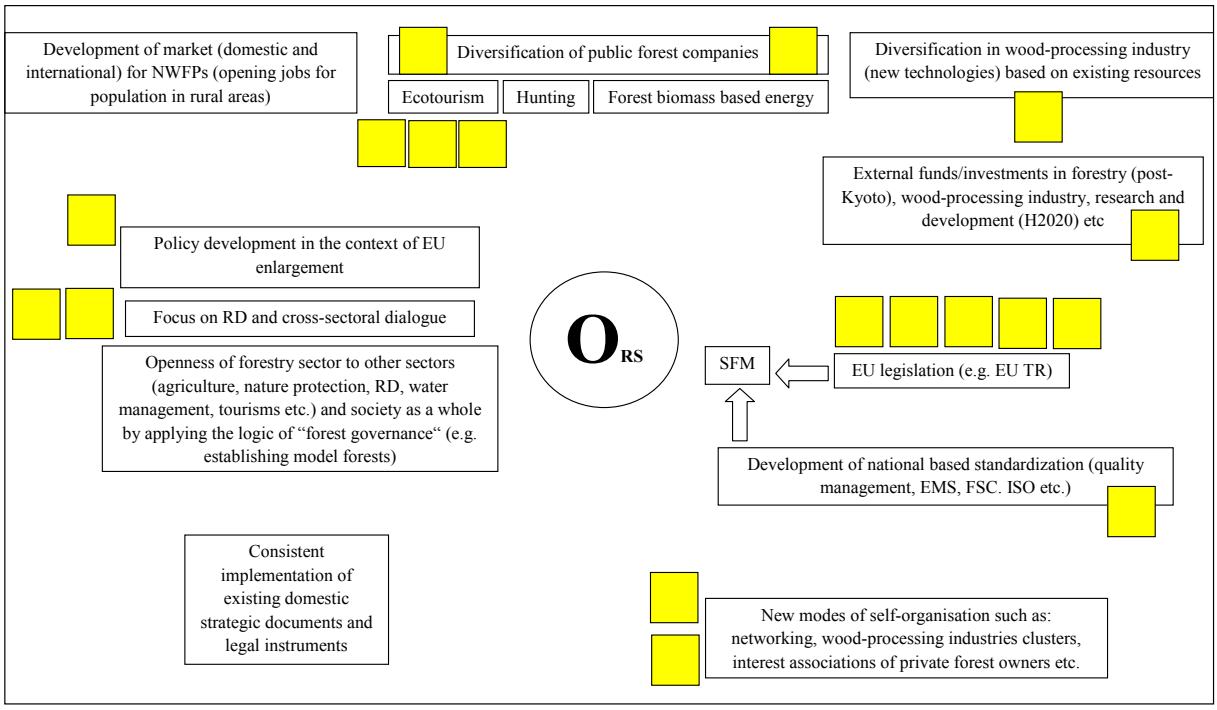
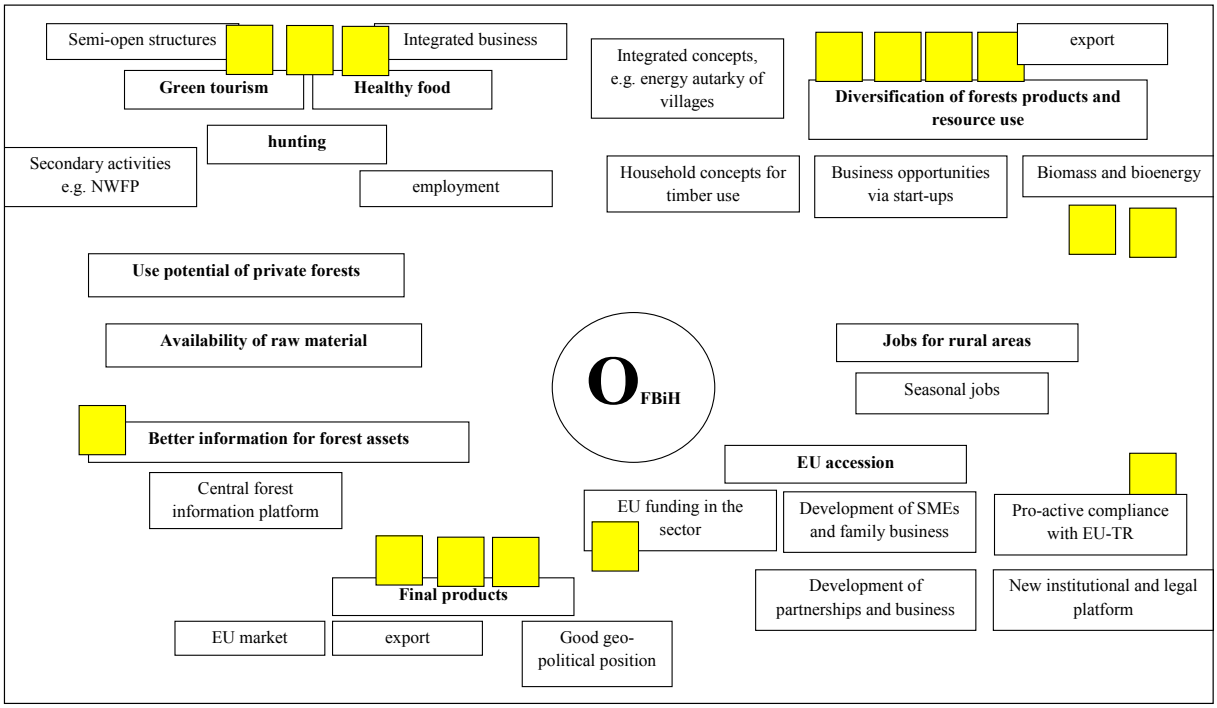


Fig. 10.6 Opportunity map for FBiH



The three top opportunities identified by the workshop participants are:

RS	FBiH
• EU legislation	• Diversification of forest products
• Eco-tourism	• Green tourism / healthy food
• New modes of self-organization	• Final products manufacturing

It is interesting to see that for RS, the EU and its legislation are rather perceived as an opportunity for further development, as compared to FBiH, where this aspect falls under threats. In general, eco-tourism, and diversified and integrated production chains are perceived as biggest opportunities of the sector.

10.2.4 Threats

Fig. 10.7 Threat map for RS

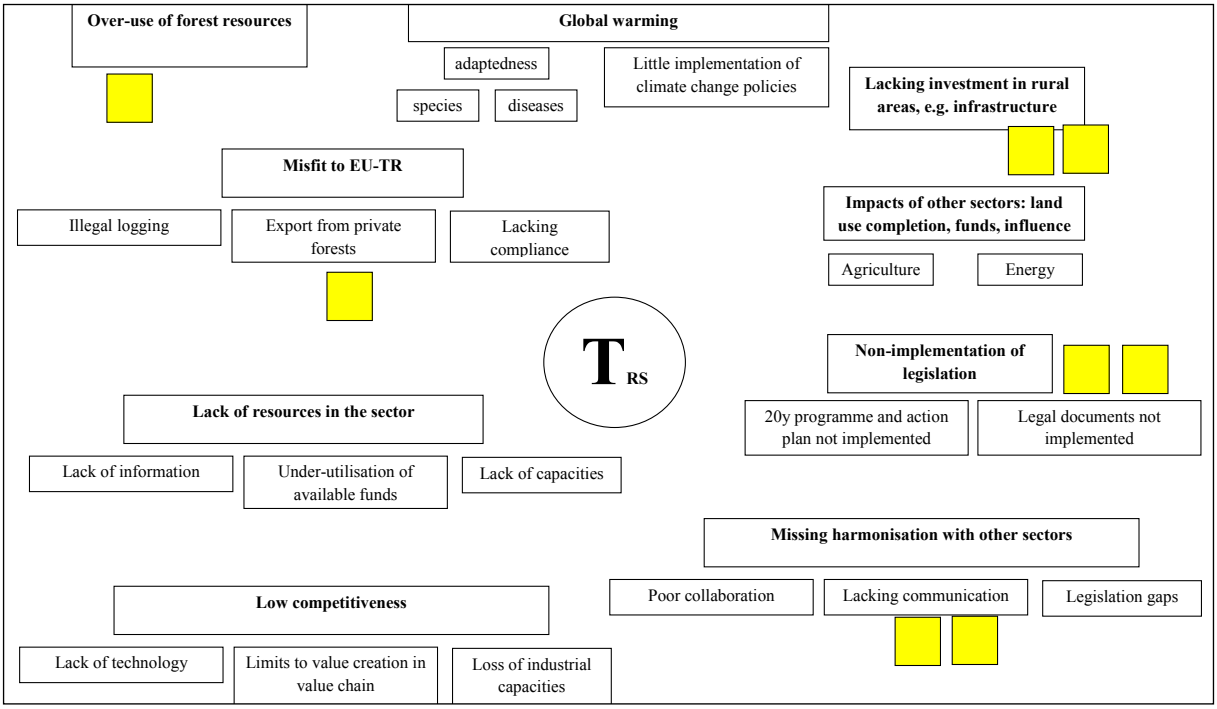
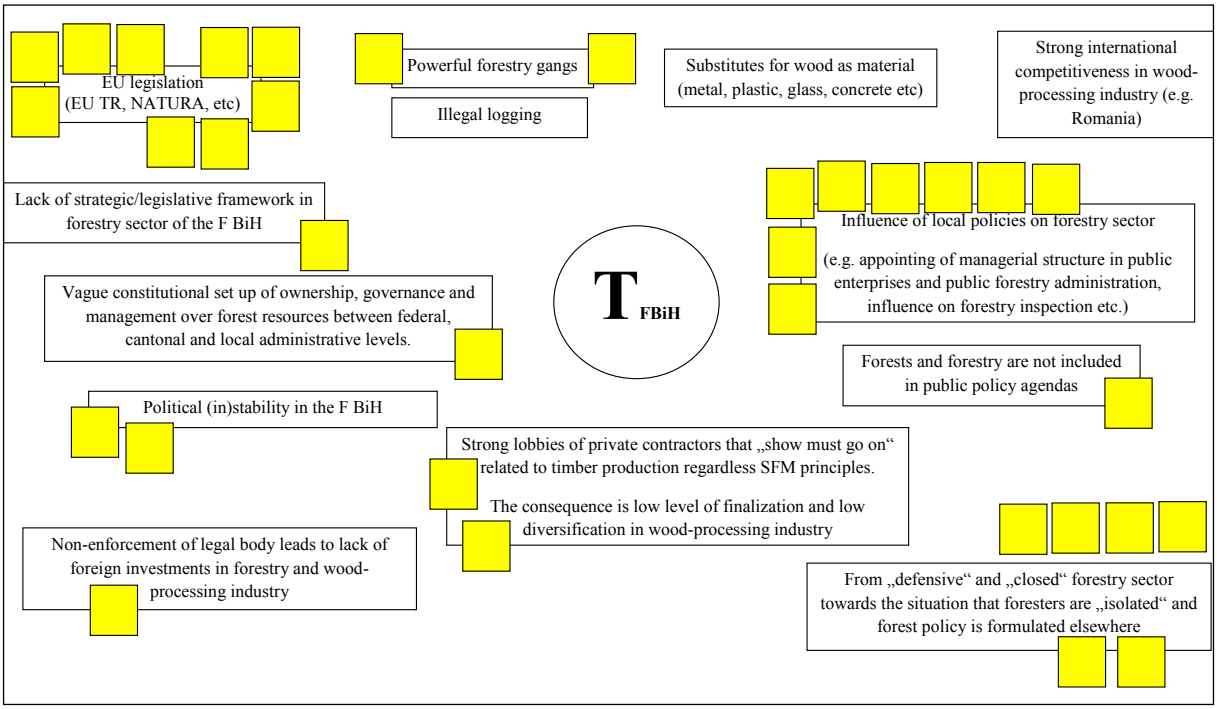


Fig. 10.8 Threat map for FBiH



The three top threats identified by the workshop participants are:

RS	FBiH
• Lacking investment in rural areas	• EU legislation
• Non-implementation of legislation	• Influence of local-policy making on forestry
• Missing communication with other sectors	• Isolation of the forest sector

From the workshop results, it seems that stakeholders in FBiH appear to be more pessimistic due to the high number of priority votes given to threats. There is particular concern about compliance with EU and its standards, which makes an opportunity rather a threat. Also, the isolation of the sector and the habit of local policy-making are not seen positive. For RS, the votes for threats are rather decent and mostly refer to currently identified weaknesses.

11. Recommendations: priorities for action and investment needs

The analysis of the forest sector study revealed a multitude of aspects to be potentially addressed by a future IPARD implementation in BiH. The focus was on those items that render the forest sector relevant for rural development in compliance with the EU *acquis*.
In summary, the aspects listed below need to be addressed in the future. The priorities for actions related to specific aspects are provided under the relevant sub-chapter 11.4.

Forest Resources and Management

- The rich forest resources in BiH are currently underestimated and bear a potential for a stronger role in a renewable natural resource strategy;
- The publishing of new forest inventory data is mandatory for achieving a more accurate planning of mobilizing these resources, where most accurate data are required;
- There are a vast number of areas that are currently not productive or inaccessible. Making them accessible bears the largest potential to increase forest resource use;
- Forest diversity in BiH is extra-ordinarily rich and requires respective incorporation in forest management planning in a geographically heterogeneous environment;
- Coppice forests, many of them in private ownership, need to be specifically addressed in order to bring them back under forest management and make sustainable use of their potential role in both, biodiversity maintenance, but also biomass production;
- Among forest damages, human-induced impacts forms are most relevant. Forest fires are of increasing abundance, and require specific fire management responses;

- NWFP are a widely used resource in BiH and have a major potential for sustaining livelihood in rural areas, however marketing of NWFP needs to be substantially improved to increase access to national and international markets.

Land Use and Land Use Change

- Decrease of population and land abandonment impose a major obstacle to rural development;
- Urbanization tendencies, especially around cities, lead to loss of natural and semi-natural habitats;
- There is lacking or inconsistent land use and spatial planning with low enforcement and implementation of planning and controlling instruments;
- There are no proper modalities for land valuation and estate trading;
- The process of land restitution is still not entirely finished and there is a match of power for peri-urban sites with high value and distribution activities towards marginal, rural areas.
- Land mine contamination is still a relevant factor also for land use change in BiH. Land areas which are still mined face less land utilization and are subject to non-management and re-wilding;
- Rural poverty leads to high pressure on forest land in terms of firewood demand and illegal logging activities;
- There is a shift from forest vegetation to lower value forest types of primary successions, which threatens to decrease economic potential and value creation in rural areas.

Forest-based sector

- The level of complexity in forest management organizations does not support an adaptive forest management in rural areas;
- Private forest owners manage around 20 percent of the forests in BiH but widely lack capacities and resources to properly manage their forests;
- Public forest enterprises are currently economically underperforming and have a strong social role as employer. A higher profitability of public forestry could create additional assets for rural development;
- Forest infrastructure (i.e. forest roads) and harvesting technology are insufficient to grant efficient forestry operations;
- The sawmilling industry is characterised by over-capacities and use of outdated technologies. Technological innovation and coordinated production clusters are needed to increase efficiency in the sawmill operations;
- The traditional business of high quality furniture in small and medium-sized enterprises is a big asset of the wood-sector in BiH;
- There might be a promising field for business development, in particular for veneer / hardwood plywood, particleboard, MDF;
- The creation of an industrial biomass sector can be seen as among the most promising fields for investments but needs respective strategic planning of resource and capacity needs, infrastructure and logistics;
- Wood pellet production and biomass-based heat production can be major areas for future investment.

Forest-based products, services and value chains

- BiH shows huge potential for wood mobilizations but needs investment in forest infrastructure and technology and improved methodology for forest management planning;
- BiH is a net exporter of primary and secondary forest products, and there is further potential to generate domestic value-adding in the processing industry;
- The exports of wood products show increasing trends while imports stagnate which provides a trade balance surplus to the country;
- The wood-based sector is a sector of growth in BiH both as regards revenues and exports;
- The employment rate in the wood-based industries is increasing, but for the forest-based sector in general modern skills and know-how is lacking;
- Production and sales of sawnwood is by far the most important product category in BiH, wood manufacturing and furniture production play also a significant role;
- There is room for development of the NWFP sector, as it is currently underestimated and not properly documented. Value-adding steps of NWFP processing and brand creation can create new market opportunities;
- Fostering associations of forest owners and the forest-based industries is needed for a more coherent horizontal and vertical organization of the sector;
- Integrated approaches of Eco-tourism and nature protection show quite some potential, but require a change in forest management planning and introduction of participative and cross-sectoral processes. Private financing mechanisms and investment opportunities have to be explored;

- Climate change and carbon trading mechanisms have to be explored as synergetic marketing option (e.g. REDD+);
- Forest certification bears huge potential for multi-functional forest management. Access to certification for private forest owners has to be facilitated in order to avoid competitive disadvantages.

Forest governance

- Currently, forest policy is decentralized and designed by entities;
- Current forest policies need more inclusive and participatory processes to reach forest owners and forest users;
- Demands of local communities, civil society, businesses and international organizations need to be incorporated in forest policy making, which requires new modes of forest governance;
- Sustainable forest management is a key factor for rural development but needs implementation in forest policy and forest management;
- The process of joining to EU is a significant driver of change in forest policy in BiH;
- The principles of forest governance are largely embedded into formal forest policy documents but still they are not part of forest management practice;
- Payment for forest ecosystem services represent solid basis for improvement of overall forest condition but require proper economic instruments to create returns for the forest sector.

Level of attainment of relevant EU standards

- Combat of illegal logging is one of the predominant objectives for rural development. This embraces the fighting of corruption, better presence of controlling, and awareness-rising in the population;
- The new EU Timber Regulation imposes severe changes onto the forest-based sector in BiH. Installing institutional structures for certification and collaboration with the sector is essential to guarantee business development with the EU both in the private and corporate sector;
- Adjusting national standards with EU standards is a mandatory preparatory step for EU accession and shall be spread to the national forest-based sector stakeholders accordingly;
- The harmonization of seed and seedling production with EU law on reproductive material and trade is essential to support export from BiH to the EU.

Education and training

- The importance and changes in role of forest sector in rural development is not adequately emphasized by current educational systems of forest sector in BiH;
- Practical training, as mechanism for linking educational programs with current issues in forestry-related topics, both at secondary schools and faculties in BiH is weak;
- Lack of knowledge in socio-political and economic aspects of natural resource management is significant shortcoming of forestry professionals in BiH;
- Cooperation of secondary and higher education institutions and forest management enterprises is not sufficient;
- Allocation of funds for research in forestry is insufficient and unequally distributed;
- Financing of post-educational trainings in forestry is insufficient and vary from one institution to another.

The analysis of the forest-based sector, the key conclusion and their assignment to the IPARD instrument revealed a list of crucial issues for future investment and action. In addition, the results of the SWOT workshops gave insight into priorities as expressed by the stakeholder of both RS and FBiH. The verification of the relevance of the aspects identified in this study was widely confirmed there. As regards their importance the SWOT exercise highlighted as priorities for action:

- The richness of forest resources and the role of ecological and product diversity (e.g. NWFP) bears potential for future production and marketing;
- The potential of integrated production forms such integrated heating systems based on bio-energy shall be sought;
- The assets of forests for eco-tourism and marketing of ecosystem services as future market potential shall be examined and fostered;
- The experience and craft in producing wood products (e.g. furniture) and potential to increase the share of final products in the value chain;
- The use of FSC certification to access markets and support compliance with international markets, but the shortcoming in accessing certification for private forest owners;
- The important role of the EU accession process and the potential and barriers to EU compliance is one of the key issues for the sector and needs clarification and capacity building;
- The formation of new modes of self-organization within the sector is instrumental for the viability of the business;
- The fragmentation the isolation of the sector and lack of cross-sectoral dialogue, and lacking coordination among the entities has to be overcome;
- The failure of creating the full value in the forest-wood chain needs to be improved in the context of rural development;
- The poor financial situation of the sector and lacking return of land-use related taxes in the sector have to improved;
- Educational shortcomings to respond to new demands on forest management and planning hamper further development of rural development;
- The weak implementation of forest policy and strategies needs to be overcome to make the sector competitive and compliant with EU *acquis*;
- Lacking investment in infrastructure, technology and capacities in the sector is a main obstacle for a viable forest-based sector;
- The political instability of BiH and its incoherent political system is a general problem for business creation;
- The power of local political system and opacity in forest management, estate trading, and instalment of managerial posts has to be addressed and improved.

The following sections discuss these identified items against the axes and components of the IPARD programme and provide recommendations for each of them.

11.1 Priorities for action

Priorities for action are based on the findings of the forest sector study including the stakeholder comments and are pinpointed according to the major elements of the IPARD, i.e. the three axes of IPARD and their categories of measures, and the new forestry measure of IPARD 2013–2020[29].

29 EC, 2014: ESTABLISHMENT AND PROTECTION OF FORESTS: Draft measure fiche for IPA rural development programmes 2013-2020

11.1.1 Axis 1 - Improving market efficiency and implementing community standards

Axis 1 addresses three major fields of intervention. In the context of the BiH forest sector study the following is recommended.

1) Investments in agricultural holdings to restructure and upgrade to the EU standards

The ownership structure in the forest sector is difficult to compare with holding structures in other sectors; e.g. agriculture. 80 percent of forests are publicly owned and the remaining 20 percent are mostly held by small-scale forest owners. However, some activities can be directly linked to IPARD Axis 1, Measure 1:

- Support sustainable forest management planning and revise forest management planning in both public and private forests using new forest inventory data;
- Establish new programmes for forest management planning in private forests;
- Establish fire management concepts and systems: this includes means for both fire prevention (e.g. Fuel management, awareness rising campaigns) and fire-fighting (logistics, machinery, international cooperation).

2) Investments in processing and marketing of agriculture and fishery products to restructure and upgrade to the EU standards

Investments in processing and marketing particularly address the opportunities to create additional value across the forest-wood chain. In particular the IPARD measure shall be used to generate better pre-condition for private investment. IPARD Axis 1, Measure 2 should be linked in terms of:

- Support the establishment of regional horizontal and vertical marketing platforms of wood products and NWFP;
- Support the development of concepts and access to investment in modern sawmilling technology and logistic chains;
- Feasibility studies for best locations for creation of veneer / hardwood plywood, particleboard, MDF industries and investment opportunities;
- Feasibility studies for best locations and investment opportunities in the bioenergy sector in BiH;
- Feasibility studies for best locations and investment opportunities in wood pellet production, integrated heating systems, local and a distant heating systems, use of wood waste;
- Support an innovation programme with calls for pilot and demonstration projects for value adding wood processing and manufacture;
- Establishment of a web-based information platform on the forest-based sector for forest producers, traders, manufacturers, the public;
- Facilitation and exchange programmes for import of international know-how in wood-based industries;
- Establishment of new trainee programmes in wood-based industries;
- Exploration of climate change mitigation and carbon trading mechanisms as synergetic marketing option (e.g. Redd+), and respective information campaigns;
- Programme for making forest certification accessible for forest owners.

3) Supporting the setting up of producer groups

The almost inexistent organization of private

forest owners has been identified as one of the key issues for enhancing sustainable forest management practices, coherent wood mobilization, and proper representation of forest owners in the political process. IPARD Axis 1, Measure 3 should hence target at:

- Programme for financial and institutional support of private forest owners associations (representation) and cooperatives (technical and marketing).

11.1.2 Axis 2 - Preparatory actions for implementation of the agri-environmental measures and Leader

Axis 2 addresses two major fields of intervention. In the context of the BiH forest sector study the following is recommended.

1) Preparation for implementation of actions relating to environment and the countryside

Forests in BiH constitute a major share of environmental resources, and are a major space for biodiversity conservation and management, as well as for water and welfare provision. IPARD Axis 2, Measure 1 should be used to address those issues in terms of:

- Support further pilots for future Natura 2000 implementation in forests for different holding size classes, public and private forests and develop prototypes for financing instruments;
- Develop concepts and examine hotspot areas for biodiversity and areas for stronger biomass production in coppice forests;
- Run pilot projects on payment for ecosystem service schemes including contractual nature conservation, eco-tourism, water provision, carbon trading, etc.

2) Preparation and implementation of local rural development strategies

Rural development strategies play an instrumental role for any IPARD implementation. The forest-based sector in a broad definition is subject to cross-thematic strategies and regulations. To ensure a coherent role in rural development, issues such as forest strategies, energy policies, spatial planning, environmental policies, and rural development strategies have to be streamlined and harmonized. IPARD Axis 2, Measure 2 shall support this in terms of:

- Establish a new programme for forest spatial planning including inaccessible areas and create a priority list of forests to be made accessible;
- Reinforcement and harmonization of spatial planning instruments;
- Support of institutional changes and political processes by EU in the areas of spatial planning;
- Establishment of a priority plan for land mine clearance (in forest land);
- Support institutional mechanisms for combating illegal logging, and enforcement of a controlling and safeguarding system of illegal logging activities;
- Foster institutional platforms for strategic forest policy making across entities, support of implementation of a national forest programme;
- Capacity building for EU standard implementation and information campaigns within the forest based sector.

11.1.3 Axis 3 - Development of the rural economy

Axis addresses four major fields of interventions. In the context of the BiH forest

sector study the following is recommended.

1) Improvement and development of rural infrastructure

Rural infrastructure is key for any improvement of production, logistics, and marketing in the forest-based sector in BiH. This entails both public infrastructure (roads, water supply etc.) and infrastructure in enterprises (e.g. industry compounds, forest roads). IPARD Axis 3, Measure 1 is to contribute to improve rural infrastructure in terms of:

- Development of a concept for optimising forest road and harvesting infrastructure;
- Foster the establishment of vertical and horizontal logistics chains and respective infrastructure in the forest-based sector;
- Support modern communication technologies and web-access infrastructure in rural areas;
- Support exploration of private financing mechanisms and investment opportunities, including investment in tourism infrastructure in rural areas.

2) Development and diversification of rural economic activities

Future accession to the European Union might imply stronger competition and compliance pressure to EU standards. IPARD represents a proper instrument for fostering product diversification, niche detection, and brand creation to render rural economies compatible on the national and international market. IPARD Axis 3, Measure 2 shall support this in terms of:

- Support the establishment of regional horizontal and vertical marketing platforms of wood products and NWFP;
- Financial and structural support to maintain and create small and medium-sized enterprises in the forest and wood processing sector including amendments of tax systems and programmes for start-up financing (including grants, micro-credits);
- Feasibility study for investment opportunities in integrated heating systems, local and a distant heating systems in municipalities;
- Support in marketing and brand creation of end-manufactured wood products and in the production and marketing chain of NWFP.

3) Training

Training is a major component of capacity building measures that are required in the forest-based sector in BiH to modernize operation and support compliance with EU and its *acquis*.

This includes trainings at all levels from continuous education, training in cross-sectoral issues of rural development such as eco-tourism and land management, to a revision of the education of engineers and forest land managers/administrators.

IPARD Axis 3, Measure 3 shall address training and capacity building needs in terms of:

- Awareness rising, training and capacity building with private forest owners for sustainable forest management;
- Import of international know-how in wood-based industries, and establishment of new trainee programmes in wood-based industries;
- Capacity building programmes for EU standard implementation and information campaigns within the forest based sector;
- Support for curricula revision and

connection to international education programmes;
- Establishment of a multi-level training programme for forest ecosystem management and rural development to re-educate workforces;
- Establishment of cooperation mechanisms between education institutions and enterprises.

4) Technical assistance

Technical assistance provides direct technical support in order to improve know-how, technology, and logistics.
IPARD Axis 3, Measure 4 can be used to contribute to the following actions:
- Technical assistance for a revision of the forest administration and public forest enterprises;
- Technical assistance for new forest road construction and improving harvesting technology.

11.1.4 IPA II forestry measures

Among others, the IPA II /IPARD 2014-2020 programme of the European Commission defined a measure on forestry[30]. This programme foresees the three main pillars of
- Afforestation & agroforestry,
- Fire prevention and restoration after fire, and
- Improving the resilience and environmental value of forest ecosystems.

All three pillars have a rather ecological approach, and are applicable for parts of the identified priorities for action. While afforestation is of only limited gravity in a richly forested country like BiH, and agroforestry did not gain high on the agenda; e.g. in the SWOT workshops, the measure of fire prevention and restoration is a highly recommended means to implement some of the key proposal of this study. Also, measures for improving the resilience and environmental value find their counterpart in the recommendations; e.g. for Natura 2000 pilot cases.

11.5 Investment needs

Against the identified issues of concern in the forest-based sector in BiH, a range of investment needs can be identified.

In section 5, the main investment needs in the subsector were identified as:
Forestry:
- Restoration and expansion of the forest road network;
- Investment in modern harvesting and logistics technologies;
- Capacity building in human resources in forest management and administration.

Sawmilling and Manufacturing:
- Restructuring of the wood-processing industry, continue to increase the added value; of its products, increase net export and improve business relationship with the supplier;
- New investments in joinery and solid wood furniture, as well as in other new wood-based industries branches that are currently lacking.

Bioenergy:
- The sector is currently only at early stage of development and needs sincere start-up investment for bio-energy concepts, integrated heating concepts etc.

As stated earlier and highlighted in the

30 EC, 2014: ESTABLISHMENT AND PROTECTION OF FORESTS: Draft measure fiche for IPA rural development programmes 2013-2020

SWOT workshops, the institutional set-up is particularly complex for private investment in BiH. Overcoming insufficient law enforcement, political instability, complex dialogue among the entities, corruption and illegal activities such as illegal logging are deemed essential to attract private investors in the future. Therefore, investments in setting-up institutional/political dialogue and planning in the forest-based sector may be considered an important pre-requisite for any other investment strategies. Therefore, these investments in capacities, communication, and dialogue are of extreme importance to create an investment-friendly environment for the private corporate sector, and are included in the proposed list of investments as well.

The nature of investment needs entails technological, structural and institutional measures to be potentially addressed by an IPARD intervention. It must be emphasized that the estimated costs are derived from experiences from other countries and studies, which implies that for an IPARD application project proposals have to be submitted according to the IPARD rules and regulations. Figures are only indicative and may be subject to priority needs of entities, cantons, and municipalities as main beneficiaries.

However, these figures give an appropriate estimation for some of the main investment needs. In many cases, start-up financing, feasibility studies, pilot and demonstration projects, and institutional support may be most efficient, also to stipulate subsequent private investment.

According to the IPARD structure a suite of proposed investment is summarized in the following table.

Table 11.1: Proposed investments for IPARD in the forest-based sector in BiH

Measure	Total investment (EUR)
Axis 1 - Improving Market Efficiency and Implementing Community Standards	
Start-up of a forest harvesting machinery ring in RS and FBiH including demo machinery (2 harvesters á 350k Euro, 2 cable cranes á 400k Euro per entity) and instruction course/train-the-trainer system	3 300 000
Web-based marketing platform and information system for the forest-based sector in BiH	1 000 000
Funding for establishment, infrastructure, PR and maintenance for three forest owner associations and cooperatives	900 000
Three feasibility studies for best locations for creation of wood processing industries and investment opportunities (grants)	1 500 000
Example: Solid wood end-manufacturing plant - chairs (FIPA, 2006)	3 100 000
3 feasibility studies for best locations and investment opportunities in the bioenergy sector in BiH (grants)	1 500 000
Example: Combined heat and power bioenergy plant (13MWth, 2MWel, 5MW process steam, FIPA, 2006)	10 500 000
2 pilot projects for NWFP processing and storage in a cooperation of producers, processers and retailers including investments in technologies (packing, cooling, drying, freezing)	4 000 000

Axis 2 - Preparatory actions for implementation of the agri-environmental measures and Leader	
Mine-clearing programme for forest land until 2030, priority planning and implementation for a 5 years period (EUR 5 000 per ha for 25 000 ha of priority area)	125 000 000
6 Leader-type demonstration projects for Natura 2000 projects (open calls)	4 200 000
Establishment and implementation of a relevant strategic initiatives and processes (e.g. Forest Development Programme, Forest Strategy etc.) (3 years programming phase)	1 500 000
Axis 3 - Development of the Rural Economy	
Innovation grant programme for start-up SME businesses in the wood-processing sector (10 grants á 100k Euro annually for 3 years)	3 000 000
Innovation grant programme for start-up SME businesses in the NWFP sector (10 grants á 70k Euro annually for 3 years)	2 100 000
Infrastructure programme for eco-tourism, prioritization of areas, development plans	25 000 000
Establishment of a multi-level training programme for forest ecosystem management and rural development (3 years, 50 persons/year á 10k Euro) plus development costs and training staff	2 500 000
Technical assistance for road construction (1000 km in next 10 years) priority planning needed	75 000 000
IPA II Forestry measures	
Establishment of a fire management system prototype in RS and FBiH including management concept, machinery, PR, institutional training	10 000 000
Establishment of fire prevention infrastructure such as fire-break belts (2 pilots plus impact assessment)	5 000 000
Investments into seed and seedling production (seed objects, nurseries, equipment education, marketing, EU compliance)	3 000 000
Silvicultural measures to secure forest cover in the karst region (management plans, alternative management, trial plots, science-practice exchange), 2 programmes, one for each entity	5 000 000
Improvement of silvicultural practices in forest management (design of new codes for afforestation, tending, harvesting, techniques, know-how, equipment, multifunctional management), 2 programmes, one for each entity	12 000 000
Forest management programmes for private forest owners (including training and education, guidelines, handbooks, new media) , 2 programmes, one for each entity	3 000 000
Sanitation of forest damages from natural disasters (according to first estimates of damages)	5 000 000
Clarification of demarcation between state and private forest properties (200EUR for 100 000 private properties, i.e. 20 percent of total properties)	20 000 000

For wood-based industries, the figures refer rather to investment opportunities (for private investors) than investment needs. A FIPA study (2006) lists some potential investment opportunities and their costs:

- Particleboard mill: investment cost of EUR 77 million;
- MDF mill: investment cost of EUR 77 million;
- Veneer mill: investment cost of EUR 10 million;
- Parquet (solid wood): investment cost of EUR 5.3 million;
- Edged Glued Panels: investment cost of EUR 6.5 million;
- Furniture (solid wood chairs): investment cost of EUR 3.1 million;
- Combined Heat and Power plant: investment cost of EUR 10.5 million.

As mentioned earlier, these proposed measures need political will, agreement, prioritization, and often private co-investment. Also, it is evident that not all measure will be implemented simultaneously and are subject to actual IPARD means in the end. It is revealed that the items of mine-clearing and forest road construction will require the most substantial public investment needs. Investments in eco-tourism (partly) and industries (mostly) shall attract private funding in order to be attractive. In this respect, smaller IPARD funding for start-up activities, structural and institutional pre-conditions, and demonstration and good practice examples might be efficient.

However, measures that address the competitiveness of the whole forest-based sector will have to comply with a broader selection of the new IPARD portfolio; e.g. measures on investment in agricultural holdings, setting up producer groups, rural infrastructure and diversification of agricultural activities.

Please address comments and inquiries to:

Regional Office for Europe and Central Asia
Food and Agriculture Organization of the United Nations (FAO)

Benczúr u. 34, 1068 Budapest, Hungary
Telephone: (+36) 1 461 2000
Fax: (+36) 1 351 7029
Email: reu-registry@fao.org
Website: www.fao.org/europe/en

FAO Regional Office for Europe
and Central Asia

22 January 2015