Natural Resource Management in Southeast Europe: Forest, Soil and Water
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<tr>
<td>BiH</td>
<td>Bosnia and Herzegovina</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>ECRAN</td>
<td>Environment and Climate Regional Accession Network</td>
</tr>
<tr>
<td>ETCWs</td>
<td>Erosion and Torrent Control Works</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EU WFD</td>
<td>EU Water Framework Directive</td>
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<td>EUTR</td>
<td>EU Timber Regulation</td>
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<tr>
<td>FBH</td>
<td>Federation of Bosnia and Herzegovina</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>IPA</td>
<td>Instrument for Pre-Accession Assistance</td>
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<tr>
<td>IPARD</td>
<td>Instrument for Pre-Accession Assistance for Rural Development</td>
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Our environment delivers goods, functions and services on which human welfare and quality of life depend. This is especially true in rural areas, where the population directly depends on the use of natural resources as a major source of income and employment.

Soil, water, forests and biodiversity, are the most valuable assets for economic progress and development. A long and difficult transition period of the countries of the SEE, divergent policy visions and development pathways have led to unsustainable use and degradation of natural resources in the region, and are limiting growth of both the rural communities and the countries.

Intensive and inappropriate agricultural production techniques, unsustainable forest management, overgrazing and illegal logging have led to increased soil erosion, more frequent torrential floods and severe environmental problems that have subsequently reduced environmental services and protective functions.

Inter-sectorial cooperation among authorities responsible for agriculture, rural development and environment is a major challenge in light of the urgent need for action given that integrated policy development and planning as well as investment mechanisms are still rare. The situation has been exacerbated by constantly increasing demands on natural resources, the effects of climate change as well as out-migration from rural areas in the SEE.

The divergences between use and conservation of natural resources require an integrated approach and inter-sectorial coordination between the institutions responsible for agriculture, rural development, and environment, as well as multi-stakeholder processes at all governance levels. The EU accession process provides the common framework for all countries in the region, and offers the momentum for regional policy harmonisation and coordination as well as applied cross border cooperation.

In this context, the Standing Working Group for Regional Rural Development in South Eastern Europe (SWG) together with the Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH initiated this regional assessment approach to provide evidence based policy recommendations to the countries, the region and the international development partners. The regional assessment has been realised within the framework of the SWG-GIZ project “Rural Development through Integrated Forest and Water Resource Management in Southeast Europe” (LEIWW) on behalf of the German Cooperation.

On this occasion, SWG and GIZ would like to express their compliments and acknowledgements to the Ministries of Agriculture, Rural Development and Environment from the SEE region, to the Regional Cooperation Council (RCC), as well as to all participating experts, the Forest Faculty of Belgrade and the University of Natural Resources and Life Sciences (BOKU), Vienna. We would like to extend our acknowledgement to the GIZ Advisor, Ms. Elena Gavrilova, and the SWG Project Manager, Ms. Dori Pavloska Gjorgjieska, for their coordination roles of the process, as well as to Mr. Oliver Pop Arsov for his technical assistance.

On behalf of the SWG Secretariat
Mr. Boban Ilic
Secretary General

On behalf of GiZ LEIWW
Mr. Benjamin Mohr
Team Leader
PART A: REGIONAL ASPECTS

RELEVANT TO THE FOREST, SOIL AND WATER RESOURCES IN SEE
CHAPTER A1
Key issues regarding the management of the natural resources

Natural resources are one of the key assets in the SEE countries/territories. It becomes evident that forest ecosystems, freshwater ecosystems and agricultural land play a dominant role in their landscape and resource pattern. Being a reservoir of biodiversity and soil creation during and after the ice ages, the SEE shows a particular richness and appears as one of the biodiversity hotspots in Europe.

The region has undergone massive political and societal changes in recent decades. After the breakdown of Yugoslavia, national systems developed in different ways, while all the countries/territories in the region including Albania had to face new challenges trends. What changed completely is a stronger linkage to a globalized world, to global problems such as climate change and a strong connection to European activities in particular with regards to the European Union (EU). SEE countries are in various stages of EU membership negotiation and cooperation, all having in common that the EU constitutes a major partner and market for natural resources and their products. On the other hand, a clear divide can be seen from developing the opportunities to utilize these resources for rural development and national welfare. Facing bio-economy as a leading driver of European future economic direction, natural resources are placed on the central stage. This includes: biomass use for bioenergy and biofuels, material substitution of non-renewables, the provision and marketing of ecosystem services, and a sustainable approach towards food security, climate resilience, resource use and competiveness is a fundamental cornerstone of the way ahead.

Among these different stages of development, commonalities for SEE countries in their main commodities (and non-commodities) of forest, water, and soil are identified here following the principal understanding that natural resource management has to deliver an integrated approach since they are closely intertwined.

Before going more into detail, some eight major trends can be delineated:

1. **Under-development of the forest-based and natural resource sector**
   The SEE countries/territories are rich in forest resources, yet they are greatly limited to primary production, lacking development in secondary and tertiary economic cycles. This renders countries/territories at the levels of self-subsistence and raw material exporters, while value creation is widely happening outside the region. Investments in technology, infrastructure, and capacities shall help make the sector using the benefits of resource allocated closely and find a new position in a natural resource based economy.

2. **Uncontrolled land use to be tamed**
   Land use is dominated by land abandonment in rural areas and increasing urbanization, which creates a hanging gradient between active land management and pressure on urban and peri-urban land. Uncontrolled settlement and building activities have major impacts on soil loss and water management. On the other hand, the assets of natural resources cannot not be harvested if rural areas decline.

3. **Ecosystem services bear great potential**
   The SEE countries/territories have great opportunities in natural resources in regards to the richness of biodiversity, freshwater systems, and scenic beauty. A clearer understanding on marketing ecosystem services can serve as an additional backbone for rural development, but requires clear responsibilities, the enforcement of entrepreneurship and investment to develop a healthy system of ecosystem goods and services to be inclusively incentivized.
(4) Business environment to be strengthened
Managing and utilizing natural resources is not a key issue. It strongly relies on business initiatives, investment, and improving both production and marketing infrastructure to compete. It is important that these predicaments are fostered in compliance to EU legislation and policies to gain access to important markets not only with raw material, but with value-added products that strongly build upon the experience and skills that are available in the region. Tradition combined with a modern view must create a common bond in delivering high-class wood products, non-timber forest products, or services that can be associated with tourism in rural areas.

(5) Private land owners to be activated
One of heritages of the socialist system is the fragmented land ownership in the region. Land disconnected with their owners in the wake of the privatization and restitution process is a major source of uncontrolled natural resource management. It is important to support private activities, help making land an attractive asset, promote sustainable and responsible ways of using land, and help develop future-fit strategies that render land management an attractive enough vision for keeping rural development viable.

(6) Resilience is an integral concept to natural resource use
A sustainable understanding of natural resource use in a changing world needs to take respect and response to both regional and global trends. Fostering resilience of ecosystems is a key concept for such an endeavour. This relates to integrated strategies for climate change adaptation and mitigation, water use, and maintenance of productive soils. Effective erosion control, water management, adaptive forest management, and forest fire prevention are among the key features in this understanding.

(7) Institutional framework needs an integrative and coordinative boost
It is not unique to the SEE countries/territories that natural resource use is a cross-cutting issue where institutional structures fail to comprehensively organize sustainable, knowledge-based arrangement of affairs. Clearly, the institutional setup of natural resource use has to go beyond its administrative arrangements, which can be diagnosed a central weakness in the region. Scattered, sectorially isolated responsibilities will not overcome multi-sector issues such as rural development, watershed management or ecosystem services provision. Since experiencing so many similar problems, the reinforcement of intra-regional cooperation and exchange alongside alliances with the EU and EU countries, and programs can create essential boosts in this direction.

(8) Capacities and education are worth investing
It is an essential notion that education and capacity-building are under-developed in the region. Natural resource use expertise needs to be more than an appendix to the countries’ future strategies. While the principal educational and academic infrastructure is there, they suffer from lacking funding and require more regional and international cooperation. Internationally funded projects need to create more value for money and justify better, long-lasting impacts. If capacity-building is not enhanced properly, there is the impending danger of brain loss of the best minds leaving the region.
A1.1 Methodology

The main objectives of the whole report were:

(a) assessing the current situation and trends of natural resources, management, governance including the identification of gaps in the national contexts;
(b) assessing the national compliance with the EU acquis communautaire including the identification of gaps;
(c) comparing national results to be able to give political guidance; and
(d) identifying key issues and challenges that need policy intervention and formulation of policy recommendations.

The analytical approach pursued was based on three functionalities:

- screening and comparing natural resources, their management and governance in each of the six countries/territories;
- evaluating the current state of compliance with EU regulations and strategies; and
- identifying gaps, key issues and challenges that need policy intervention.

Three overarching questions guided the data collection:

- assessment of current situation, trends and gaps: What is the situation and trends of natural resources (here forest, water, soil) and their management and governance in terms policies and institutions in place? Can national and regional gaps be identified?
- current state of compliance with EU legislation: How do currently the six countries/territories individually and collectively meet EU legislation and strategies in relation to forest, water and soil?
- definition of key challenges and policy recommendations: Which key issues and challenges require policy interventions on the basis of the analysis?

To answer questions (a) and (b) national correspondents collected data and prepared related national reports. Key challenges and policy recommendations were derived from the analysis and comparison of all 6 national reports. In order to avoid separate forms of data collection for answering question (a) and (b) an integrated data collection approach was recommended that follows the structure of the EU Forest strategy complemented by a list of priorities identified from the water framework directive. The first 6 priorities named in the EU Forest Strategy functioned as the major cross-reference to this study and were used as headers for sub-chapters of the national reports:

1. Supporting rural and urban communities.
2. Fostering the competitiveness of the sector and sustainability of forest-based industries, bio-energy and the wider green economy.
3. Forests in a changing climate.
4. Protection forests and enhancing ecosystem services.
5. Improving the knowledge base.
6. New and innovative forestry and added-value chains.

In addition, the compliance of the six countries/territories with the EU Acquis communautaire was scrutinised, i.e. combating illegal logging and the implementation of the EU Timber Regulation, phytosanitary standards, product standards, and genetic material, and IPARD cornerstones, i.e. (i) improving market efficiency and implementing community standards, (ii) implementation of the agri-environmental measures, (iii) development of the rural economy, and (iv) IPARD forestry measures.

This had three advantages:

1. Streamlining data collection efforts in all six countries/territories was easier with one common reference point.
2. Evaluation and comparison as to how those EU forest and water policy objectives are met in the 6 national contexts was simpler since the same kind of data were to be collected. Cross-cutting issues between forest and water might were covered in the context of ecosystem services.
3. The European Commission itself evaluates the implementation of the EU Forest Strategy for its member countries in the future and will most likely use the same or a very similar structure for its report. This said, this envisaged report can then be easily used to compare to EU activities in the future.

Data collection was conducted along the six priorities identified from the EU forest strategy but complemented by important missing topics.

For water and soil issues a similar approach was designed. Cross-cutting issues as the forests role for water provision, and safeguard against water hazards (floods, erosion) and soil hazards were to be highlighted. According to the EU Water Framework Directive, the following priorities were defined:

1. River basin management.
2. Flood management.
3. Clean water and water quality (white water).
4. Waste water treatment and reuse (grey water).
5. Water scarcity and droughts.
6. Climate change effects.

A mix of quantitative data and qualitative data was collected, together with providing information on resource management, and the institutional and policy framework in place. All this analysis was done for six countries/territories in the form of national reports, being an integral part of this report. The regional report was synthesised based on the data collected in the national reports, and made comparable to allow for regionally valid statements.
CHAPTER A2
Status of the Forest, Soil and Water Resources in SEE

A2.1 Introduction

Regional characteristics in natural resources (forest, soil, water) in Southeast Europe (SEE) are very diverse in spatial and temporal terms. Good statistical data is the basis of a proper analysis and overview of natural resources. The data from the individual countries/territories differs widely in its scope and quality, therefore direct comparisons of the data and indicators between SEE countries/territories are often questionable. This is the first regional overview on natural resources. The results warned of the difficulties in gathering data, as well as the differences in characteristics and status of natural resources. This chapter is dedicated mostly to presenting the main characteristics of natural resources that are important in their management, monitoring and protection. Even though poor public databases in the region limit the potential scope of such analyses, they are nevertheless useful in discussing the orientation of natural resources policy towards an integration into the EU.

The cross-country overview is based on the understanding of natural resources policies in the SEE countries/territories, while also accounting for the limitations imposed by data availability and quality. The chapter focuses on the comparative analysis of natural resources characteristics in the region.

A2.2 Status of forest resources in SEE

A2.2.1 Forest area by management and protection regime

The total area covered by forests and forest land in the SEE countries/territories have been established within the National Forest Inventory. The SEE countries/territories have developed National Forest Inventory harmonized with EU countries, with exception of Macedonia. The forested area by country/territory is shown in Table 2.1. The data presented in Table 2.1, as well as those given in Figure 2.1, 2.2, and 2.3, are from different years for the period from 2008 - 2016 (Albania-2016, BiH-2012, Kosovo* - 2012, Montenegro-2010, Serbia-2008 with corrections 2015). The old official data regarding the status of forest resources in Macedonia (Forest Inventory 1979) are complemented with data from the Macedonian Forests Enterprise. The given value refers to the total area covered by forests and forest land. The national reports provide more details for forest areas as classified by categories (economic forests, non-economic forests, protected forests, special purpose forests, protection forests). In Macedonia, the forest area is defined as economic forest. The collection of data and the monitoring of the forest status are dispersed to different institutions in most SEE countries/territories.

* This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence. Hereafter referred to as “Kosovo*”.
The highest percentage covered by forest and forest land of 69% has Montenegro, followed by Bosnia and Herzegovina with 63%, while the lowest territorial percentage covered by forests and forest land has Serbia-29.1%. The percentage presence of the forest compared to the total area of the territory is provided in Figure 1.

The data analysis of the areas under high and coppice forests indicates a larger share of coppice forest. A larger area under coppice forests has Serbia, Macedonia, and Kosovo*. Kosovo* has the highest percentage of coppice forest as compared to the high forests (high forest covers only 15% of the forest area) (Figure 2). The share of the coppice forest is smaller in Albania and BiH, which have almost the same share of high forest and coppice forest (57: 43%).
A2.2.2 Growing stock, increment, and felling and carbon stock

Coppice forests are a high forest degradation form (generated from seeds or seedlings), which are characterized by much smaller amounts of volume and growth and by worse assortment structure and consequently a much smaller economic significance as compared to high forests. Besides that, considering their production capabilities and duration of the life cycle, the coppice forest is characterized by less ecological efficiency in terms of the amount of CO₂ assimilation and carbon sequestration.

According to the national reports, the highest average amount of timber per hectare has Bosnia and Herzegovina (201 m³/ha), Albania and Serbia have approximately the same timber volume per hectare (around 161 m³/ha), Montenegro (159.6 m³/ha), while the lowest value has Macedonia and Kosovo* (around 83 m³/ha) (see Figure 2.3).
These data lead to the conclusion that the existing state of the forest by the amount of wood produced per unit area is the best in Montenegro and the worst in Macedonia and Kosovo*. These data should be considered in the context of the contribution of forestry to the sustainable development of the referred countries/territories from economic and environmental perspective.

Average values of annual felling are not provided by all countries/territories, due to the lack of official information. Data regarding the amount of wood harvested per hectare are missing. Displayed data has a value that ranges from $385 \cdot 10^3$ (Albania) to $5.718 \cdot 10^3$ m$^3$ (Montenegro).

In the most SEE countries/territories, there is no relevant data on the amount of carbon stock. In Albania, the data about the amount of carbon produced by forests is missing, but a project by which Albania will generate $22.954$ tons of CO$_2$ per year until the 2020 year (by increasing the forested area, decreasing the degradation process and improving the water quality etc.) is in the preparation. Bosnia and Herzegovina also has no information about the carbon stock of Macedonia forests. According to the data from the national report, Kosovo* has carbon stock of $6,142,173$ t CO$_2$, Serbia about $120.2$ mill metric t C total (average per ha – 53.4 t), while Montenegro has $1,253,738.73$ t carbon in increment.

A2.2.3 Forest types and ownership by management regime

SEE is dominated by broadleaf forests, with the highest presence in Montenegro and Kosovo*, where as much as 91% and 93% are covered by broadleaves as compared to coniferous forests. The percentage share of deciduous is also high and amounts to 82%. The most common species in this area are beech and oak, while beech in Serbia is more present in public forests, while oak is present more in private forests. In Bosnia and Herzegovina, this species is the most present in high and coppice forests, in both public as well as private forests. In Macedonia, the most common species is oak with 31.3% and beech with 23.6%. From softwood, the most common species are black pine, white bark pine, Australian pine, etc.

![Figure 2.4 The forest land ownership structure in the region (Source: National Reports - Part B)](image)

According to the studies of the European Forest Institute (EFI), Schmitthusen, Hirsch et al. (2010), in Europe, around 49.6% of the forests are privately owned and approximately 50.4% are state-owned.

In SEE countries/territories forests are predominantly owned by the state. The data sources of forest land ownership differ among SEE countries/territories and were collected in the period from 2010 - 2015 (Albania-2015, BiH-2012, Kosovo*-2013, Macedonia-2015, Montenegro-2010, Serbia-2015). The highest
percentage of the forest in state ownership has Albania (97%), and the lowest Montenegro (52.3%). A high percentage of state owned forests have Macedonia (89.1%) and Bosnia and Herzegovina (80.7%) (Figure 2.4).

A2.2.4 Forest health and damages

Based on the review of the damages caused in forests of the SEE countries/territories, it can be concluded that the greatest threat to forests in the period of 2011-2015 were human-made, natural disasters, and plant diseases. The biggest damages in plant diseases had Montenegro and Kosovo*. Otherwise, in Kosovo* in total, 14.5% of the growing stock were affected by damages. In Albania and Macedonia, the biggest forest damage was human made, while in Bosnia and Herzegovina in the previous period, damages to forests were mainly caused by forest fires. In Serbia forest damage was caused as a result of natural disasters occurring primarily in 2014 during major flooding as well as due to ice-break and wind damage in the forest.

<table>
<thead>
<tr>
<th></th>
<th>Albania</th>
<th>Bosnia and Herzegovina</th>
<th>Kosovo*</th>
<th>Macedonia</th>
<th>Montenegro</th>
<th>Serbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total for period 2011 to 2015 (1,000 m³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human made</td>
<td>43,574</td>
<td>531</td>
<td>600</td>
<td>114,157</td>
<td>20,457</td>
<td>95,530</td>
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<tr>
<td>Damages by insects</td>
<td>-</td>
<td>252</td>
<td>909</td>
<td>4758</td>
<td>3,979</td>
<td>48,781</td>
</tr>
<tr>
<td>Natural disasters</td>
<td>-</td>
<td>430</td>
<td>258</td>
<td>26,471</td>
<td>-</td>
<td>1,664,701</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td>-</td>
<td>29</td>
<td>1,119</td>
<td>-</td>
<td>235,868</td>
<td>41,448</td>
</tr>
<tr>
<td>Damages by forest fires</td>
<td>8,400</td>
<td>1,162</td>
<td>459</td>
<td>35,291</td>
<td>-</td>
<td>105,287</td>
</tr>
<tr>
<td>Other (define)</td>
<td>-</td>
<td>-</td>
<td>36,042</td>
<td>-</td>
<td>10,932</td>
<td>4,728</td>
</tr>
</tbody>
</table>

A2.3 Status of water resources in SEE

Hydrographically, SEE countries/territories belong to the Black Sea (Serbia, Kosovo*, BIH, Montenegro, Macedonia) Adriatic Sea (BIH, Montenegro, Albania, Kosovo*) and Aegean Sea (Macedonia, Kosovo*) basins. Water is discharged from the area of 207,831 km², with mean annual precipitation of 734 mm (Serbia), 758 mm (Macedonia), 1,250 mm (BIH), 1,485 mm (Albania), to 1,815 mm (Montenegro). The availability of water resources is closely related to the climatic conditions especially rainfall and temperature of the air. The highest temperatures of air exceed 40°C, the lowest -30°C, with the uneven annual distribution of precipitations, characterized by less than 500 mm in some parts of Serbia and Macedonia and more than 4,000 mm in the coastal part of Montenegro.

With a specific annual runoff of 44 l/sec/km² Montenegro has the highest runoff, followed by Albania with more than 30 l/sec/km², BIH-23.4 l/sec/km², Macedonia-7.8 l/sec/km², Kosovo*-11 l/sec/km² and Serbia-5.7 l/sec/km². For example, Serbia has just 1,500 m³ of water per capita yearly and in the same time Montenegro more than 30,000 m³ of water per capita yearly. Uneven water distribution is also illustrated with the fact that some parts of Macedonia are faced with a lack of water in summer time, despite the fact that there are 4,414 springs, of which 58 have a capacity of over 100 l/s, three big natural lakes (Ohrid, Prespa and Dojran), 22 larger dams and reservoirs and over 100 smaller reservoirs.

A2.3.1 River basin management

River basin management in SEE countries/territories is influenced by structural and political organization in certain countries, on the basis of local Law on Waters, EU Directives, as well as the relevant by-laws.
In BIH, with two entities, FBiH has a Water Agency responsible for water management for the Black Sea Basin, situated in Sarajevo, and a Water Agency, responsible for water management for the Adriatic Sea Basin situated in Mostar, while RS has Public Utility (PU) “Vode Srpske”, situated in Bijeljina, with units in Bijeljina and Trebinje. At the same time, the Brčko District established the Department of Agriculture, Forestry and Water Management District, under the District Government, responsible for water resources management. Water management in Serbia is under the authority of the Republic Directorate for Water of the Ministry of Agriculture and Environmental Protection, responsible for the development of legislation, water management policy and strategy, preparing flood risk management plans, action plans and coordinating with the concerned actors. The operational structure is organized within three basic territorial segments: the Public Water Resources Management Enterprises (PWRME) “SerbianWaters”, “VojvodinaWaters” and “BelgradeWaters”. In Montenegro Ministry of Agriculture and Rural Development is responsible for water management. Key national documents for the water management in Montenegro are the National Strategy for Water management, while preparation of River Basin Management Plans is in procedure. Albania has 6 main hydro graphical units called “River Basins”, with River Basin Councils (RBC), chaired by the prefect. RBC’s are supported by the River Basin Agencies (RBA), which are functioning as a technical secretariat to the RBC and enable integrated water resources management. Kosovo* has the Water Department, located in Priština, responsible for two river basins districts. The Republic of Macedonia is divided into 16 water management divisions: 11 in the Vardar River basin, 4 in the Crni Drim River Basin, 1 in Strumica River Basin, while a small area of Binačka Morava River Basin is included in water divisions Pčinja and Skopsko.

A2.3.2 Flood management

Mountain hazard related to water (torrent, landslide)

Generally, the SEE region is affected mainly by torrential and river floods, as well as erosion processes and landslides. The main factors increasing the flooding risk, besides topographic and land characteristics, are heavy precipitations, removal of forest cover, uncontrolled urbanization, the reduced discharge capacity of regulated river sections (deposition of sediment and garbage; overgrowing by shrubs and trees). 1,539 torrents are registered in Macedonia, 935 in BIH and more than 11,500 in Serbia. Torrential floods are also frequent in Albania and Kosovo*. During catastrophic torrential floods in BIH and Serbia, in May 2014, 76 lives were lost, 2.6 million people were endangered, and about 12,000 km² were flooded with material damage higher than 3 billion euros. During a torrential event in Macedonia, near Skopje, in August 2016, 22 people died, and costs of losses and damages were significant. Dominant hazard in Montenegro is also torrential floods and erosion processes, with damages higher than 60 million euros, in the period 2010 - 2016. During torrential floods in the region were recorded maximal discharges from 8.2 m³/s/km² (Serbia) to 10-12 m³/s/km² (Albania and Macedonia), which corresponds to recurrence intervals of 100-500 years.

Landslides in the SEE region commonly occur due to increased amounts of precipitation, high levels of groundwater and the unplanned construction of houses and road infrastructure on slopes, uncontrolled cutting of forest and mineral resources exploitation. For example, 30% of Serbia’s territory is threatened by landslides or some kind of mass earth movements which affects more than 40,000 locations.

From the 1950’s to the 1990’s, numerous erosional and torrent control works (ETCWs) were conducted in the SEE region, which had direct and indirect effects. These works significantly reduced the production of erosive material on slopes and sediment transport in the hydrographic network and improved infiltration-retention capacity of soil. But in the last 20 years a noticeable a lack of ETCWs and preventive measures related to the concept of integrated management in torrential watersheds, due to decreased financial support, inadequate or poorly applied legislative, disappearing of governmental bodies and companies related to water resources management was noted.

Flood risk management plans

Preparation of flood risk management plans (FRMP) is a necessary measure for effective flood protection and sustainable spatial planning, but it is still in an initial stage in the SEE region.

A preliminary flood risk assessment is prepared for the whole territory of the Republic of Serbia and contains: maps of the river basin areas in the proper scale; a description of the history of floods; assessment
of potentially harmful consequences of future floods. BIH prescribed a methodology for their preparation, while in Macedonia the first flood risk management plan is in preparation. Numerous municipalities in Macedonia and Serbia have prepared Operational Plans for Flood protection in accordance with existing national legislation.

A preliminary Flood Risk Assessment was not developed in Albania so far; however, there are some ongoing activities (collecting data on floods; flood prone area mapping). A Flood Risk Management Plan has been developed for the lower part of the Rivers Buna and Drini, through pilot project, but there is not systematic elaboration of an FRMP for each Unit of Management. Municipalities and RBA in Kosovo* are in charge for preparing operational plans and maintenance of existing protective infrastructure.

Some of the main issues for preliminary flood risk assessment are water monitoring and modelling, which did not reach the necessary level in the region (insufficient number of measuring stations, especially on watersheds smaller than 50 km²) so far. Monitoring of surface water regime is carried out in 217 stations in Serbia and underground water regime in 415 stations; a surface water regime in Montenegro is observed in 21 stations; surface water regime in Albania in 92 stations. Sedimentation issues such as sediment discharge and deposition are much neglected, despite the fact that fulfilling of reservoirs for drinking water supply is an evident problem in the region, while bed load sediment significantly reduces the capacity of river beds during flood events. Early warning systems were established just at a few watercourses in the region.

**Flood protection**

Outstanding river training works have been undertaken in the SEE region (sections of the rivers Danube, Sava, Pčinja, Crni Drim, Ibar, Beli Drim, Bregalnica, Bosna, Trebišnjica, Vardar, Južna Morava, and Morača, etc.). Numerous large dams with reservoirs were built for flood protection, with a retention volume of 100 - 800 millions of m³. Montenegro provided protection against floods on the territory of about 50 km², for 3 settlements. Albania has 860 km of embankments, of which 86 km were reconstructed in the period 2011 - 2015. Serbia provided protection against floods on the territory of about 13,260 km², for 644 settlements, by usage 3247 km of embankments and numerous river regulations. Besides, there are some negative environmental effects of performed works (loss of connection between surface and ground water due to river bad lining, degradation of habitats and biodiversity, significant changes to erosion and sediment deposition as a result of channel straightening, loss of floodplain wetlands after the construction of embankments).

The erosion and torrent control works (ETCWs) in the SEE region started at the end of 19th century, but became organized only by 1907. In the period from 1907 to 2015, significant work was performed, including technical works (check dams, bank protective structures, torrent training) and biotechnical works (a forestation, forest protective belts, silt-filtering strips, grassing, terracing and contour farming). The priority is the protection of settlements and road networks from torrential floods and erosion control in watersheds of water supply system reservoirs.

Generally flood protection in the region is still not at satisfactory level and shows a weak institutional support and organization.

**A2.3.3 Water quality**

**Classification of the ecological state of water bodies**

Water quality assessments need classification systems based on biological, hydro-morphological, chemical and physical-chemical parameters (EU-WFD characterization), as the starting point of most planning documents. In BIH entities, FBiH 4 classes of water bodies are determined, in RS 5 classes of water bodies (based on two groups of criteria, environmental and chemical status), in accordance to local regulations. Classification of 499 water bodies in Serbia is performed in accordance to EU-WFD characterization, in five classes: (I) excellent (II) good, (III) moderate, (IV) bad and (V) poor. Currently there is no monitoring and classification of water bodies in Montenegro in accordance with EU-WFD directive, but only a programme of systematic examination of water quality and quantity. The ecological status of surface
bodies in Macedonia has not been defined yet, except in some regions (Prespa lake sub-basin, Bregalnica sub-basin and Strumica basin), where the classification of the ecological status was done in accordance to the WFD methodology. Albania applies water quality assessments using EU-WFD characterization. Kosovo* uses UNECE Water Quality Classification standards and still has not water quality classification based on the EU WFD standards, due to lack of capacities and proper data monitoring.

**A map of the monitoring network**

In BiH, the water quality monitoring is systematically carried out at 58 river measuring points, as well as the condition of the water quality in reservoirs/lakes, important for water supply is monitored. The monitoring system in Serbia has 140 measuring points, which provide data for the Serbian Water Quality Index (SWQI) obtained by aggregating nine parameters of physical-chemical and microbiological parameters of a water quality. The water quality monitoring in Montenegro is performed on surface and ground waters at 44 sampling locations at rivers and 11 sampling locations at lakes. In the main rivers in Albania the water quality monitoring is realized in 34 stations, while the lake monitoring is done in 6 stations and in one in the Butrinti Lagoon. The maritime water monitoring affected by the urban waters is done in 10 stations, while the ground water monitoring is realized in 41 stations. Kosovo* has a monitoring network for surface water, which consists of 54 stations, not covering groundwater quality monitoring.

**Surface water (ecological and chemical status)**

Large water bodies in Serbia such as the rivers Danube, Tisa, Sava, and Drina satisfy the criteria for the quality class II (good). The water quality of the River Danube at the outlet of Serbia is appreciably higher than at the entrance. An exacerbated quality was registered mainly in smaller streams in Central Serbia, canals in northern part of the country, as well as near larger settlements. The condition of surface water quality in Serbia is relatively good, facing the fact that less than 10% of waste water is purified in an adequate manner. The surface water quality report (2015) of Montenegro states that rivers in the Adriatic Basin mainly show a good quality (the rivers Morača, Zeta, Cijevna, Crnojevića, and Bojana), while in the Danube River Basin some rivers do not have a good status (the River Ćehotina and its tributary, the Vezišnica), due to pollution from the thermal power plant, the coalmine, lead and zinc mines. The River Lim has good water quality in the upper and middle course, while downstream from Berane the water quality deteriorates (contains nitrite and phosphate). Some water courses are endangered during the low flow in summer (River Grnčar) or by inflow of pollutants from communal waste deposit sites and wastewater (Tara River). Water quality measurements in Albania shows that very good and good quality (I, II classes) were observed at 41.2% of all monitoring stations, moderate (III class) at 35.3%, and poor and bad status (IV, V classes) at 23.5%. Results of physical-chemical data monitoring in the last five years in Kosovo* show that the quality of water is good, except on the sections through settlements due to inflow of municipal and industrial wastewater. The most polluted water is registered at some sections of the River Sitnica and Beli Drim.

**Groundwater (chemical and quantitative status)**

The natural groundwater quality in Serbia is quite uneven which is a result of various mineralogical-petrographic composition, the genesis of groundwater and aquifers, water age, varying intensity water change and ranges from exceptional quality that does not require treatment as compared to waters that require very complex procedures of conditioning before it can be used for public water supply. According to the results of the analysis, 34 water bodies (23%) are at risk or possibly at risk, while for 119 water bodies (around 77%) can be considered that they are not or probably not at risk. Dominant pressures that are believed to cause a bad chemical status of water bodies are agricultural activities and unregulated sewage network of urbanized areas but also other negative impact should not be ignored such as municipal and industrial waste dumps, which can cause significant pollution of groundwater locally. Monitoring of underground water in Montenegro is not in accordance with EU Water Framework Directive and analysed samples show moderate to good quality status. Groundwater in Albania mainly have good physical-chemical properties, with higher concentrations for certain indicators (Cl, Mg, Na, SO₄) in some wells. Also, some aquifers are classified as areas of high salinity. Macedonia and Kosovo* don’t have systematic monitoring of groundwater quality, except for some projects and research activities.
Natural Resource Management in Southeast Europe: Forest, Soil and Water

Waste water treatment and reuse

Untreated municipal and industrial wastewater is a key source of pollution of the surface and groundwater in the SEE region.

Seven plants for wastewater treatment are functional in BIH: six in FBiH and one in RS (they cover 3% of population in FBiH, and 1.43% in RS). Average value of total wastewater production in BIH (in period 2011 - 2015) amounts to 95.6 x10^6 m^3, and an average value of total purified wastewater (primary, secondary and tertiary treatments), in the same period, amounts to 3.4x10^6 m^3 (about 3.6% of total waste water production). The main urban centers in Serbia (Belgrade, Novi Sad, and Niš) still have not planted for wastewater treatment. Only 5 - 10% of the wastewater is processed and just 20% of the municipalities have facilities for purification. More than 50% of industrial facilities in Serbia do not purify waste waters, due to a lack of proper equipment or financial sources for their maintenance.

Almost 50% of total population of Macedonia is not connected to the public sewage system. Existing systems are mainly old, with significant leakage of the wastewater in the ground, with very small number of wastewater treatment plants. Most of the wastewater is being discharged directly into rivers and lakes. Currently around 45% of total population in Montenegro is connected to the sewerage systems. Average value of total wastewater production in Montenegro (years: 2011, 2014) amounts to 47.5.10^6 m^3, and average value of total purified wastewater, in the same period, amounts to 20.5.10^6 m^3 (about 43.1% of total waste water production). Currently, Albania has 7 wastewater treatment plants, and another one is under construction. About 50% of Albanian population is connected to sewage systems, mostly in urban areas. Extensive and severe contamination of coastal areas, rivers and riverbeds is registered due to direct wastewater discharge into water bodies. Kosovo* has one urban wastewater treatment plant with a capacity of about 8,000 equivalent population and some small rural treatment facilities. Technical documentation for wastewater treatment plant is already prepared for all bigger cities in Kosovo*.

A2.3.4 Water demand

Water supply

Water resources are a fundamental element of the vitality of the infrastructure systems that affect the prosperity of the society. The main hydrological feature in SEE countries/territories is the spatial and temporal unequal water distribution and significant lack of water resources in certain areas (parts of Serbia, Kosovo*, Macedonia). Total fresh water (surface + underground) abstraction at annual level varies from 328x9.106 m^3 (BIH, period 2011 - 2013), 263.5x10^6 m^3 (Kosovo*, period 2011 - 2015), 3,710x10^6 m^3 (Serbia, period 2011 - 2014) to 109x10^6 m^3 in Montenegro (2011). Municipal water withdrawal per capita in Albania amounts to 177.1 m^3/yearly. The usage of fresh underground water dominates in BIH (83.2%), Montenegro (81%) and Albania (75%), while in Serbia amounts 13.1% and in Kosovo* 11%. The total number of households in BiH connected to water supply systems amounts to 686,149 (FBiH-56% of population, RS-48%, BD-30%) and the rest of the population has individual supply from other sources (shallow wells, springs). Water supply coverage in Albania amounts to about 80.5% in the period 2012 - 2015, 70% in Kosovo*, 89% in Macedonia, 80% in Serbia, 60% in Montenegro. The urban population in the SEE region has a much higher level of availability to public water supply systems then rural population. Average water losses are very high in the SEE region, up to 60% in Montenegro and 55% in Kosovo*.

Water scarcity and droughts

In the light of climate change, SEE region is extremely endangered by the emergence of dry periods during the year as recorded in recent history (1997-2016), which can also be expected in the future. In order to minimize negative effects of droughts, particularly those that affect agricultural production and water supply, water management must be carried out primarily on the basis of continuous research of changes in the cycle of rainfall and evapotranspiration. Next step should be defining the ecological requirements and develop management plans for drought periods in vulnerable regions.

The problem of droughts is evident in the SEE region and affects the agricultural production, water supply, as well as some associated phenomenon (forest fires, plant diseases). Severe droughts have caused enormous damages to the agriculture in BIH and Serbia, in 2000, 2003, 2007 and 2011. Huge areas in
the central part of Macedonia, with average annual precipitation <500 mm, are extremely endangered by
droughts and process of desertification as well as the southeastern parts of Serbia. Estimated damage on
crop production in Montenegro (2011), due to droughts, amounted to 30-60% of expected yield.

Irrigations

The SEE region has strong potential for irrigation on huge surfaces (more than 2 million hectares), but
effective irrigation is performed on a much smaller area. Many existing irrigation systems are not in use
due to inadequate maintenance, indifference of owners and users and lack of financial sources. According
to available data, only 8,875 ha of land in BiH are covered with irrigation systems. Serbia has just 42,000
ha of land covered by the irrigation, while the suitable area covers about 1.9 million ha. Macedonia has
106 smaller and larger irrigation systems that cover an area of 163,693 ha of fertile arable land (49.9%
of the area that may be irrigated). The irrigated area in Montenegro represents less than 3% of the total
agricultural land and of this only about 12% has modern irrigation systems. An estimated 360,000 ha
have been equipped for irrigation in Albania, but just 72,000 ha of fertile land are irrigated. From the total
irrigable surface of 57,100 ha in Kosovo*, 22,880 ha of agriculture land is effectively irrigated (2014).

A2.4 Status of soil resources in SEE

A soil information system was not established in most SEE countries/territories. In some, such as Albania,
there are no data at the national level relating to soil characteristics, including depth, structure, texture,
humidity, depth of the humus layer, etc., while in others there are data only regarding some soil characteristics
(Kosovo*, Montenegro, Serbia). A soil information system was established only in Macedonia in 2015. This
system collects data for the following aspects: soil types, administrative divisions, pH values, organic
matter map, CaCO₃, clay, silt and sand content, land capability.

Most counties in the region have digitized soil map for the whole territory, and some of them have a digital
soil map only for the small part of the territory. A new soil classification system of BiH as well as into the
FAO classification and all information is now available in GIS format. The soil classification system in
Serbia is based on the genetic principles and does not correspond to the World Reference Base for Soil
Resources (WRB) criteria.

SEE countries/territories are characterized by pedological diversity which results as a consequence of a
long and complex process in a variety of geological, climate, water and vegetation conditions. In this region
automorphic soils cover most of the territory (in BiH and Serbia over 80% of the territory), hydromorphic soil
occupies a smaller area, while halomorphic soil occurs in an insignificant percentage. The most common
soil type in BiH are calcomelanosol (21%), dystric cambisol, calcocambisol etc.; in Macedonia the most
presented are: forest cambisols (16%), proluvium etc.; in Kosovo*: cambisol (about 42%), rankerexes,
vertisols etc.; in Serbia: cambisols (distric cambisols 32%, eutric cambisols 5.5%), chernozem (15%),
vertisols (8.5%), ranker (7.4%), etc.; and in Montenegro: rocky ground (lithosol and regosol), calciferous-
dolomite dark soil, rendzinas, rankers etc. In Albania, classification of soil was done according to the USDA
soil taxonomy, while in the other SEE countries/territories soils were classified according to the FAO soil
classification compliant with World Reference Base for Soil Resources (WRB) criteria.

A2.4.1 Soil degradation

The main processes connected with soil loss and soil degradation in the SEE countries/territories are as
follows: degradation of soil physical properties, chemical (salinisation, acidification, and nutrient depletion),
biological degradation and soil loss (due to soil erosion and landslides). Soil erosion is one of the most
common forms of land degradation, which confirms the fact that approximately 1.3 million km² of Europe is
threatened by erosion (taking into account the EU Member States), with the average loss of land estimated
at 2.64 t per ha per year (Jones et al., 2012; Panagos et la, 2015). The European mean value is 3.5 t per ha
per year, while the total soil losses (produced sediments) are 1973·10⁶ tonnes. The average soil loss in the
Western Balkan Countries is 7.13 t per ha per year (maximum in Albania 18.7 t/ha) and the total soil losses
(produced sediments) are 141·10⁶ tonnes. That is 7.6% of the whole soil losses in Europe (Blinkov 2015).
In the South East Europe, soil is threatened by degradation processes of which the most present are erosion processes of different intensity. Water erosion is dominant in the whole area. To determine the loss of land in EU countries, different methods are used, such as USLE, RUSLE, PESERA, and others. Some states, (mostly SEE countries/territories: Serbia, Montenegro, Macedonia, Kosovo*) for assessing the state of erosion and for calculation the soil loss use the Potential erosion model developed by Gavrilovic (Gavrilovic, 1972) as the basic model for assessing the intensity of soil erosion. According to the available maps of erosion, 35.55% of Serbia’s territory is affected by erosion of the highest categories (I-III), 55.5% of the territory of Kosovo*, and 36.65% of the territory of Macedonia.

### Table 2.3 Soil erosion in some regional countries/territories (Source: National Reports - Part B)

<table>
<thead>
<tr>
<th>Country/territory</th>
<th>Total average annual erosion (mil m³)</th>
<th>Specific annual erosion (m³×km²)</th>
<th>% territory under I, II and III categories by Gavrilovic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kosovo*</td>
<td>-</td>
<td>-</td>
<td>55.5%</td>
</tr>
<tr>
<td>Macedonia</td>
<td>17.0</td>
<td>685</td>
<td>36.65%</td>
</tr>
<tr>
<td>Serbia</td>
<td>37.3</td>
<td>422</td>
<td>35.55%</td>
</tr>
<tr>
<td>BiH</td>
<td>16.5</td>
<td>323</td>
<td>-</td>
</tr>
</tbody>
</table>

Total average annual gross erosion in Serbia amounts to 37,249,975.0 m³, i.e. specific annual gross erosion amounts to 421.57 m³×km² while annual sediment transport is 9,350,765.0 m³ and specific annual sediment transport is 105.80 m³×km². The total annual erosion for Macedonia is about 17 million m³ or 685 m³/km² per year, with about 7.5 million m³ or 303 m³/km² annually.

At a national scale, every year 8 - 24 ton/ha of soil is eroded and discharged to the sea or filling up reservoirs (including hydropower plants reservoirs) highly reducing their capacity in Albania (48% no erosion, 16% little erosion (>3 tons/ha/year), 12% average erosion (3 -12 tons/ha/year), 14% high erosion (12 - 60 tons/ha/year). In relation to the categorization according to Gavrilovic, it can be considered that 26% of the territory of Albania is exposed to medium and strong erosion and over 75% of agricultural land. Apart from these data, many authors have analysed soil losses through the international projects in Albania. According to Zdruly et al. (2001) the estimated soil erosion values vary from 32 to 185 tha⁻¹. Grazhdani (2006) stated that the maximum erosion intensity in Albania reaches 510 t/ha y in Gjirokaster.

The total average amount of sediment, created on the territory of RS BiH per year is 16,518,031 m³ or 323 m³/km². The new Erosion Map of RS was designed in two phases (restructuring of erosion map and innovation of erosion map) during 2011. The ‘Strategy for Agricultural Land Management’ of FBH defines that it is necessary to plan and build at least ten measuring stations for soil erosion, but also theoretical methods such as the USLE method to predict the intensity of erosion in the area of FBH, and making maps of erosion and landslides.

### A2.4.2 Soil monitoring

A functional system for soil monitoring in countries SEE, however, has not yet been established. Reporting systems of soil quality monitoring in BiH are in process of being established in accordance with EEA indicators and EIONET requirements. In Montenegro for example exist two types of soil monitoring: the monitoring of soil contamination by hazardous substances and the monitoring of soil quality. Kosovo* has not yet developed a soil monitoring system and therefore there is a lack of data on the quality of the soil. No soil monitoring system does exist in Macedonia. Characteristics of soil profiles in this country analysed in the past are presented in the soil information system. The National Environment Agency of Albania is conducting some monitoring on soil erosion and soil contamination at specific hot spots and the Serbian Environmental Protection Agency is responsible for professional activities related to the data collection and production of indicators related to soil erosion and the content of organic carbon in the soil.

The national reports give an overview of land use. All countries/territories used CORINE database to
determine the land cover use. In the reports, for each country/territory is provided the trends in land use change. There is a trend of decreasing agricultural areas and forest areas in all reports.

Table 2.4 Land cover use the Third level classification of the CORINE database (2000-2012) (Source: National Reports - Part B).

<table>
<thead>
<tr>
<th></th>
<th>Albania</th>
<th>BiH</th>
<th>Kosovo*</th>
<th>Macedonia</th>
<th>Montenegro</th>
<th>Serbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry</td>
<td>37</td>
<td>39</td>
<td>57</td>
<td>40</td>
<td>45</td>
<td>29</td>
</tr>
<tr>
<td>Pasture</td>
<td>15</td>
<td>8.3</td>
<td>-</td>
<td>25</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Agriculture</td>
<td>24</td>
<td>22.1</td>
<td>40</td>
<td>26</td>
<td>37</td>
<td>46</td>
</tr>
<tr>
<td>Other land</td>
<td>24</td>
<td>30.6</td>
<td>3</td>
<td>9</td>
<td>18</td>
<td>12</td>
</tr>
</tbody>
</table>

In SEE countries/territories, a methodology for monitoring carbon stocks and organic carbon contained in the soil was developed. In some countries (Albania, Serbia), studies for determining and monitoring the content of organic matter in the soil for specific areas or measurements were performed, but the measurement is not carried out systematically and values are not relevant for the entire territory of the country.

Evaluation of total carbon stocks and carbon content in the soil is done using data prepared by the JRC of the European Commission (Bosnia and Herzegovina). The values of the content of organic carbon, which are presented in the national reports of some countries, or where an indication of their existence, are the result of the development of research projects funded by the EU or national level.

In most SEE countries/territories, an investigation and monitoring of contaminated sites is being performed. Contaminated sites in Albania are, according to the project, defined as hot spot areas, while the number of contaminated sites being monitored is different in countries. The highest number of contaminated sites (422) is monitored in Serbia, but in other countries/territories, this number ranges from 52 (now 36), 91 (Bosnia and Herzegovina), 110 (Kosovo*) to the large number which refers only to the landfill (Macedonia). A particular problem in BiH represents a landmine and other residual explosive materials contamination.

A2.5 Socio Economic Aspects and Key Challenges

A2.5.1 Employment in the forest sector

One of the socio-economic indicators for forestry development is the number of employees. In the SEE countries/territories, in the forestry sector, the number of employed persons ranges from 395 (Montenegro) to 9,238 (BiH). Montenegro has the lowest number of employees, which is proportional to its forest area, where from the total number of employees 94 are forestry engineers, 163 qualified and highly qualified workers and 138 other employees. Employees in the forestry sector in Montenegro are however extremely overaged at 55 years. In total, the number of employees in forest-based industries in Montenegro in the last period are approximately 1985, of which the largest employment is in the field of wood processing and production of wood, cork, straw. The largest number of employees in the forestry sector has Bosnia and Herzegovina (9,238 in 2014). The wood processing industry in this country employed 21,005 persons, out of whom 12,235 were engaged in wood and wood products production and 6,570 persons were employed in the furniture production.

According to a government decision finalizing the transfer of forests to municipalities in Albania, it is required that municipalities will have to employ within their administrations a total of 982 people that hold positions like forest engineers (404), forest technicians (278) and administrative and other workers
(300). Not all municipalities have employed all people as required. The number of forest related forest-based industries in this country are 1978, with the highest number in the manufacture of furniture. The wood-processing sector in Kosovo* has largely based its production on both domestic and imported raw materials and semi-finished products. The total number of employees was 3,293 in 2015. The largest number of workers is engaged in the manufacture of the furniture.

The Public Enterprise Macedonian Forests has a total of 2,232 employees. According to their qualifications, they comprise 427 graduates (mainly forestry engineers); 74 having had two years of college education; 1,140 with a high school certificate (mainly forestry technicians); and 591 with primary school education (forestry workers). According to official statistics, about 7,000 people are directly employed in forestry and the forest industry sector. Indirectly, the sector provides job opportunities (part-time jobs) to additional 35,000 – 40,000 people through multiplier effects. Tens of thousands of people rely on the forest industry for a living. The public enterprise signs contracts with more than 200 small enterprises for services like logging, transport of the wood assortments which means that it strengthen the enterprises.

Employment in the forestry sector in Serbia emphasises a large variety of educational profiles, from forestry technicians, engineers, to lawyers, economics, and ecologists. Additionally, forestry workers are included on the list, but their number can vary which depends on direct engagements from different private companies and entrepreneurs. The total number of employees is 7,636 and according to their qualification they comprise 1,527 forestry engineers, 3,054 forestry technicians, 1,145 qualified and highly qualified worker and 1,910 administrative and other workers. At the end of 2016, the total number of employees in the wood processing and furniture production industry was 30,754 (15,552 in wood processing; 15,222 employees in furniture production), with an increase of 2,262 employees (7.9%), compared to the end of 2015. The wood processing industry is an industrial sector with a number of comparative advantages because the production is based on a domestic raw material base. At the end of 2016, a total of 4,133 business entities were active in the wood industry of Serbia, of which 2,540 companies (1,786 in wood processing; 754 in furniture production) and 1,593 active entrepreneurs.

A2.5.2 Income structure and revenues of state forest companies

SEE countries/territories have a relatively high share of state forest properties. There is a common denominator that these enterprises have different functions, inter alia also a social dimension, and are not creating overly profits as compared to Western European State Forest enterprises.

The main income of the forest sector in Albania consists of sales of timber, non-timber forest products (NTFP), hunting permits and leasing of territories. Data for 2015 are missing due to the structural changes in the forest sector. Total revenues of forestry activities in 2013 and 2014 are approximately 2,000,000.00 EUR. The bulky share of the revenues is from the wood sale. The data show a drastic decline in wood sale revenues what can be attributed to the uncertainty of the sector development awaiting the completion of the forest sector reform. The biggest share of the other revenues is covered by hunting.

Public forest companies in BiH are established by governments and assemblies. The financial results of public forest companies in RS and FBiH for the period 2013 - 2015 are presented in the national report. One can conclude that the public forest companies, according to the officially available data from 2014 reported negative financial results both in the FBiH and RS. In 2015 the situation was same for the FBiH while in RS, Public enterprise Forest of Republic of Srpska reported positive financial results amounting to more than 5 million EUR. An analysis of the structure of the revenues clearly shows that the primary product of public forest companies is wood, while the revenues from other sources have not reached a satisfactory level, especially in RS where in 2015 it was reported only 943,664 EUR, while in the FBiH for the same period it was reported 7,143,416.00 EUR.

Analysing the quantity and structure of revenues realised in the forestry sector in Kosovo* shows that the main revenues have been realised from the rent of forest land, followed by revenues from the sale of standing trees (stumpage tree value) and fee collection for technical and extension services providing to private forest owners. Revenues from the sale of standing trees are far below the optimum, as a result of
the very limited amount of wood mass legally harvested in the public forests. Results derived from various studies and projects done in Kosovo* shown the amount of unregistered harvested wood mass is much higher than the wood mass legally harvested. Total revenues were 1,331,700.00 EUR in the observed period, while in 2014 gross loss was 268,981 EUR.

In Macedonia, the annual fire wood demand is around 800,000 m³ and the demand is mostly satisfied with the production of firewood from the forests in state and private property. The wood industry processes around 100,000 – 120,000 m³, which comes from forests, but due to the deficit in resources that Macedonia has in industrial wood from coniferous tree species, the import is much bigger than the production. The production of firewood and technical wood requires the engagement of manpower for logging, supplying and transporting and revenues covering their income.

So far, forests in state ownership in Montenegro were granted for utilization through the concession to legal entities. There were 18 contracts active in 2016 with the total gross wood volume of 247,694 m³. Total revenues in forest sector were 4,569,300.00 EUR in the observed period, while in 2013 and 2015 were expressed as a gross loss. In addition, wood from the state owned forest can, in accordance with the forest management program and operational project, be given to the population residing in rural areas for their own needs. For this purpose, in 2016 a gross wood amount which would be given was in the amount of up to 63,229 m³ (15,728 m³ conifers and 47,501 broadleaves). State forests can be granted for utilization by selling standing wood (on a yearly base), that is, by selling wood assortments in accordance with the forest management program that is, operational project. A tender for 2016 was opened for 167,759 m³ of wood (85,919 m³ of conifers and 81,839 m³ of broadleaves).

Based on the data from forestry public enterprises in Serbia, it is evident that a majority of revenues they have from wood sales (from 92% to 98%). Other revenues are mainly related to non-wood forest products and subsidies. Total revenues in the forest sector in Serbia were approximately 77,200,000 in the period 2013 - 2015. Public forest companies showed a gross loss of -1,170,000 EUR in 2014.

**A2.5.3 Public and international funding and investments**

During the period 2010 - 2014 the state budget in Albania has invested 3,693,000 EUR in afforestation measures and about 1,168,000 EUR in forest thinning activities with an annual average of about 1,215 million EUR. The most important project related to forests is the Environmental Services Project (ESP) with an overall value of approximately 17,000,000 EUR. Most important outputs of this project include the new forest inventory, a forest information system, and the registration of all forest properties. It also includes a grant scheme for small scale forest related activities.

The main foreign investors in the forest sector in BiH are the World Bank, FAO, and EU with main investments in the national forest inventory, projects related to sustainable forest management and renewable forest resources. State budget in the forest sector in BiH has invested approximately 10 million EUR (afforestation, management plan, etc.).

In April 2012, the Government of Kosovo* adopted a mid-term budget expenditure framework covering 2013 - 2015, detailed by agencies and sectors. In that function, the Government of Kosovo* has allocated 900,000 EUR per year for forests, from which 350,000 euros regarding afforestation of forest areas, and 550,000 EUR for the development of management plans. For the year 2015, however, the amount was reduced to 700,000.00 EUR. The larger international funding countries and organisation of the Kosovo* forest sector were: Finland, Sweden, Norway, FAO, EU-Twining, CNVP of Nederland, EU, Germany, USA, and other countries. Forest sector has received international support during 2010- 2015 an amount of 9,799,778 EUR.

Currently, there is no international funding in forestry in Montenegro as well as public funding in harvesting infrastructure, road infrastructure, and human resources. By the Concession Contract signed between the concessionaire and Forest Administration, the concessionaire is obligated for forest road infrastructure and road maintenance.
The public funding in the forestry sector in Serbia, which amount around a 6.58 million EUR, is mainly oriented towards road and harvesting (including silviculture) infrastructure, with strong influence in private forests, and hunting. Mentioned funding/subsidy is a part of the annual funding process through so called ‘forest fund’ and through financial sources for protection and improvement of forests. International investments in the forest sector in Serbia were in the last period, approximately 4,000,000 EUR.

A2.5.4 Forest products and services

The main forest product in Albania is wood for sale and it is the major contributor to the forest service revenues (889,000 EUR in 2014). Additionally, forest areas provide a variety of NWFP (medicinal plants, mushrooms, berries, pine cones, etc.), which in 2014 have contributed 10,000 EUR on revenues. Considering forest services, no marketing efforts are done as regards products and services. There is not any marketed ecosystem service yet. The Environmental Services Project is supporting the establishment of a Payment for Ecosystem Services Scheme for erosion control on important hydrological basins (hydropower and water supply).

In BiH wood and wood products are still the main sources of income, while NWFP products are still under represented with less than 5% in the total value of main marketed goods. The value of main marketed goods in 2015 for wood and wood products was 175,297,658 EUR and for NWFP 8,087,080 EUR. Data for the main marketed ecosystem services are not available for BiH.

Non-Wood Forest Products (NWFP) are part of a larger sub-sector (Horticulture) in Kosovo*. The share of NWFP of the Agribusiness sector is currently estimated at less than 10%. The total market EUR value of NWFP products is estimated at close to 10,000,000 EUR per annum, providing a large value added from semi-processing and collection and aggregation services. It is reported that there are 13 different companies active in this sub-sector in Kosovo*, with an annual turnover between 50,000 to 2,500,000 EUR. Most of the companies, in fact, sell 100 tons per year, while only a few leading companies are trading over 200 tons of mushrooms and other NWFP products per year, realizing an annual turnover of over 1,000,000.00 EUR each.

In Macedonia services that are coming from forests are not evaluated. Each year part of the population collects forest products and uses them for self-subsistence or sells them on the market. Some 50 species of mushrooms are collected, and the annual export amounts to around 320 tonnes, equalling to a value of about 1,900,000 EUR. From herbal - medical spices annually about 1100 tons with a value of approximately 1,300,000 EUR are exported. Purchase and export are done by several companies. Among wild fruits, blueberry is notable, which in 2001 was exported in quantity of 83 tons and worth 76,786 EUR. Chestnuts are collected on the amount of 250 tons per year. This includes hawthorn, raspberry, blackberry, cornel cherry, and blackthorn. In addition, wild apple, pear, cherry, sour cherry is requested as additives in fruit teas (Strategy for Biodiversity of RM).

The main forest product in Montenegro is wood (sale amounts to 89,645 m³) and values of marketed goods for 2015 reached 9,979,000 EUR. The value of marketed goods from the wood industry was 157,000 EUR and provides only a very small percentage of the total value of marketed goods in the forest sector. The figure for market value for firewood was not received by MONSTAT. In addition, according to a rough estimation of the annual income for the rural population stemming from NWFPs, it amounts to around 5,000,000 EUR.

The quantity and value of main marketed goods, including NWFP, represent a significant income for people in rural areas in Serbia. The value of main marketed forest ecosystem services, like biodiversity conservation, recreational functions, protective functions, and historical values, cannot be evaluated separately, because of a particular calculation form, but it is displayed like other revenues in forestry enterprises financial balance sheets. Generally, in Serbia, payment for ecosystem services (PES) are not valued and not part of the calculation of forests benefits. Based on data for various non-forests goods and products, which are used in Serbia, as well as a place at the market, the most interesting ones are game and game products (trophies, meat, other animal products and game shots) as provide e.g. a value of more than 16,500,000 EUR for 2010. Mushrooms, berries, herbs and other plant parts are second most
important and their value amounts to almost 13,700,000 EUR, while Christmas trees generated 1,830,000 EUR. Wild honey was also sold generating 13,700 EUR income.

### A2.5.5 Contribution of the forest sector to the GDP

Weighing the significance of the forest sector is difficult, because it is often a cross-cutting issue of different sectors (e.g. agriculture, industries). Hence, finding comparable data is a challenge.

The contribution of the forest sector to the GDP is not calculated separately in Albania. The contribution of forestry to the GDP is agglomerated with agriculture and fishing. The same holds for the contribution of wood processing and paper industry, which is calculated as part of the overall industry sector. Considering the above, it is hard to say how much the forestry sector generates by itself and so calculate its real contribution to the GDP.

The national GDP is constantly growing in a period of 2000 to 2015 in Bosnia and Herzegovina, while forestry, logging and related services, contribution to the GDP is not following that trend. The overall share of GDP is decreasing in the period 2000 to 2009 and after the global economic crisis, there is slow growth and in 2015 share in GDP is almost 1%.

There are currently no official data on the value added of the forestry sector in Kosovo*. However, it is estimated that 4 -8% of the GDP could be achieved by the forestry sector in the future given favourable conditions. In 2009 it was estimated that the forestry sector in GDP is approximately 2.5 - 3.5%, (REC, 2009). It is assumed that Forestry activities could generate value added of 20 to 40 million euros.

Forestry in the Republic of Macedonia is an economy branch that contributes from 0.3 to 0.5% share to GDP. Although, if multifunctional uses of the forests would be valorised, the contribution of forests to the GDP of the country would be considerably higher. The share of the forest industry (primary and secondary wood processing, furniture, paper, and pulp) to the GDP is estimated at 2.5 and 3%. These data can be gathered from some internal reports of relevant enterprises or institutions.

According to the rough estimate, the share of forestry and wood industry in GDP in Montenegro is somewhat less than 2%, which is similar to Slovenia but is small compared to around 3 % in the entire EU. By MONSTAT classification, forestry, agriculture and fishery sector to the GDP in Montenegro was 11.3% in 2000, and 7.2% in 2007.

According to the Republic Statistics Office of Serbia, the direct economic contribution of forestry in 2015 was 0.24% of GDP, and with the inclusion of forest industry, the contribution went up to 2.6%. A more realistic evaluation, considering the important amount of unrecorded (sometimes illegal) production, as well as incentives, in terms of suppressed prices applied to wood raw material sales to the forest industry, might place the forestry’s contribution of around 1.0%. However, this estimate does not take into account the crucial role played by forests in soil conservation, water supply, carbon sequestration, wildlife habitat and maintenance of the country’s remarkable biodiversity, nor forestry’s close relations with other sectors such as agriculture and tourism.

### A2.5.6 Trade balance

The SEE region can on the one hand be said to generate little value added in the region, while exporting mostly raw material (timber, non-timber forest products). On the other hand, the overarching demand for firewood is still the main factor for national trade-balances.

Albania is importing most of its wood supply apart from firewood. However, this will also change in the near future since the enforcement of the 10 year forest harvesting ban. The harvesting ban affects all commercial forest harvesting activities. The only collection of firewood for households and public institutions is allowed. Since 2012 some export of wood pellets, which is a new product for Albanian wood processing industry, has taken place. The development of this product could definitively improve the heating efficiency of
household stoves and reduce the overall demand for firewood. The main exported products included firewood, charcoal, and sawn wood. The main imported wood was based panels and sawn wood.

Data on the trade balance in BiH exists only for the years 2010 and 2011 (reference from the report BiH industry outlook Wood & Metal Processing Sectors, 2012). One can see that all sub-segments of the wood processing industry are export-oriented. The BiH wood processing sector has the same top five export markets. The major export market for the entire wood processing industry is Germany with a 26% share of total exports (110,848,000 EUR) followed by Croatia with 20%, Italy with 14% and Austria and Slovenia with 7% and 6% respectively. In 2011 the total production of the wood-processing industry was equivalent to 512,774,000 EUR while exports were reported to be 382,190,000 EUR. The main driver for the development of the wood processing industry in BiH is definitely export to foreign markets.

In Kosovo*, the import is much higher than the export for all wood products. Neither data as regards the quantity, nor the monetary value of imported and exported wood products (lumbers) nor other wood products, due to the classification of all wood assortments including charcoal are available. Regarding firewood quantity and value some studies show that the annual import of primary wood products (lumbers) in Kosovo* is about 221,782 m³ and only about 2,937 m³ of firewood have been registered. The import of wood and wood products has steadily increased between, 2013 - 2015.

In Macedonia, the biggest part of the import comes from plywood, coniferous lumber, carpentry, and parquet. Part of the deficit of domestic products which are covered by imports is due to the closure of former production facilities from forest industry, and part is due to the deficit in resources that Macedonia has in technical wood from coniferous tree species. Only 4 - 5% of forests are pure coniferous plantations and 4 - 5% is the participation of conifers in mixed plantations.

In Montenegro, the forest export in the period 2010 - 2015 increased from 16,540,000 to 30,030,000 EUR, while the import recorded a slight decline of approximately 3.3%. Sawmill products (17,460,000 EUR in 2015) and logs (6,120,000 EUR in 2015) had the largest increase in exports). In Montenegro, greater quantities of firewood are exported. Higher imports than exports in 2015 show buildings’ joinery and carpentry of wood, including cellular wood panels, assembled flooring panels (7,270,000 EUR), wood (including strips and friezes for parquets flooring, not assembled) continuously shaped (4,330,000 EUR), and fibreboard of wood or other ligneous materials (2,530,000 EUR).

The trade balance in the forestry sector in Serbia clearly shows that only in the last two years (2014 and 2015), export exceeded import, which is not caused by increased export, but by reducing the import almost double the size. Export of the final products and boards in the period 1990 - 2015 has increased 3 times, while exports of sawmill remained almost the same. Import in all categories in the forest sector in Serbia in the previous period increased, mostly for the final and sawmill products. The share of wood processing and furniture production industry in the gross domestic product of Serbia amounted to 1.56%, with exports amounting to 347,810,000 EUR which is 2.9% of the total exports of Serbia. There are significant potentials of expansion of the scope of activities in wood processing and furniture production industry, given that the structure of exports is dominated by products with low added value, while the share of products with high added value is only 26%. The value of exports per worker amounted to 17,000 euros, which is several times lower than in developed EU countries. Therefore, it is necessary to increase the level of finalization of raw material, which would be highly stimulating for the whole field of forestry.

A2.5.7 Illegal logging

Illegal logging is perceived as one the major issues in relation to forestry in the SEE. Indeed, illegality might comprise different aspects: crime, corruption, non-registration of cuttings, or uncontrolled use of abandoned land. Indeed, it is a regional fact that statistics on wood use and wood production don’t comply. Illegal logging, hence, has implications on land use, development of forest resources, but also on a controlled management of soil and water resources.

In Albania, illegal activities have become common already in the years prior to the social economic reform and reached a peak in 1997 and continue to date. The official statistics on illegal logging shows, however
a decreasing trend. The peak was reached in 1997 when more than 500,000 m$^3$ of illegal logging was recorded (INSTAT 2008). According to government statistics, the total volume of illegal logging is about 15% of annual felling. However, the actual volume of illegal or unregulated logging, however, probably exceeds legal harvest by a factor of ten. This can be concluded from the discrepancy between the official data on fire wood supply and actual consumption. The largest consumer group of firewood is households, but public institutions, charcoal and lime producers also consume significant volumes of firewood. The total firewood consumption by different sectors is estimated at 2.55 million m$^3$/year. This amount is taken away from the forest in an unregulated/illegal way. This is also evident in changes of the growing stock every year. In the last 15 years, changes are negative, although the government sustains that annual felling has always been below the annual allowance to cut. In order to address illegal logging and forest degradation, on February 2016 the Albanian government has enforced a 10 year ban on forest harvesting and trade of forest products for any commercial purpose. In order to enforce the moratorium, the government established a temporary task force called “green guard”, whose main task is to prevent any whatever damage to forests, public or private.

Illegal logging has been recognized as a serious problem for the BiH forest sector. Some environmental NGOs e.g. WWF claim that BiH together with other Eastern European countries represents a major source for putting illegal or suspicious wood on the EU market. According to the WWF, the amount of illegally harvested wood in BiH has been estimated to be 1.2 million m$^3$ (WWF, 2008). Official national data suggest 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 a total value of BAM 1,902,347 (Ministry of Agriculture, Water Management and Forestry of the FBiH, 2013). Illegal logging is affecting private and public forest properties, but in private forest properties, it is due to unclear property rights and abandonment of private forests as a consequence of war. In 2006, the Governments of both entities 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. Recently, some cantonal forest management enterprises in FBiH developed their internal programs to prevent and combat corruption and illegal logging. These programs are mainly based on the following pillars: formal commitment of the company to prevent and combat corruption; development and enforcement of internal structures within the 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 the importance of prevention and combat with corruption.

Based on the forest inventory done in Kosovo* in 2003 and 2012, only 70,000 m$^3$ was harvested each year, according to Kosovo* regulations, while over 90% of the annual cutting were not carried out according to regulations (Kosovo* Forest Inventory, 2012/2013). The same document states that illegal logging is identified as a problem in 40% of public forest land and 29% of private forestlands. Forest damages are caused mainly by a biotic (human) factor, through illegal activities. The population continues to find illegal ways in securing heating and financial sources by trading wood. Forested land at lower altitudes is attractive for illegal logging due to lower cost and easier access to them. There are two main factors for illegal logging: the illegal harvesting of the firewood forest for personal profits/needs from the private and public forest, and the illegal harvesting from public forestlands for organised crime. The main types of illegal logging in the Kosovo*: logging without permission from public forests, logging in protected areas such as national parks, false declaration of origin of wood, false declaration of the volume of harvested wood, illegal logging on the private forest, etc.

The problem of illegal logging and timber trade is significant in almost all SEE countries/territories and in a wider context so that it is not a phenomenon, which is specific for Montenegro. Two types of illegal logging can be distinguished: poverty driven illegal logging and commercial illegal logging. The Forest Administration receives data on illegal logging from regional units, from competent authorities. Cooperation with the Chief Engineer for silviculture and forest protection in the Forest Administration exists who coordinates all activities of this type. Officially recorded illegal logging in state forests from 2002 - 2015 was 58,714 m$^3$.

In total, the volume of illegally logged wood in Macedonia presumably ranges from 25% to 30%. Concerning the combat against illegal logging cooperation between the forest police and the police of the Ministry of
Internal Affairs takes place: the police authorities, who are responsible for suppression of all illegal activities in the country, including forest activities, take action against perpetrators together with the forestry police. However, the low number of police workers, lack of material equipment, insufficient professional capacity seemingly impedes an efficient combat against illegal logging. The institutional capacities for prevention of illegal logging inside the institutions are insufficient. The main reasons for illegal logging in Macedonia are unfavourable social and economic conditions, an insufficient number of forestry policemen and inefficient administration of the justice department. There is also a difference in the cost of the logged wood when obtained on the illegal way as it is sold at a cheaper price. Facing these problems, the term “sustainable management” was included in the Strategy for sustainable development of forestry and in the Law on Forests.

Illegal logging exists in Serbia for centuries. The reasons for that could be found in general orientation towards wood and forests as the most accessible resources, which nowadays become a ‘social problem’ or ‘social category issues’. Forest crimes are often underestimated in the legal system and not considered in the same category as other laws violation. This mainly appears in depopulated rural areas and often judges and prosecutors do not take appropriate measures towards legal protection of forests in less developed regions, consider this 'activities' as a sort of 'contribution to the rural development' of the poor population. Additionally, punishments for illegal activities in the forestry sector are very low and very often recorded cases are discarded at the courts. Illegal activities data consists of two data sources: official statistics and internal data of the Directorate of Forests (DoF), which do not correspond at all. Nevertheless, DoF data show 5.5 times larger amount of cut wood on the annual level. The discrepancy is mainly in the fuelwood where the significant amount has a final destination at ‘grey zone market’, outside of legal flow. Beside this figure, sustainability is not jeopardized jet, but the following trend is surely worrisome.

**A2.5.8 Flood management**

Torrential floods are the most frequent catastrophic events that occur in the SEE countries/territories, with serious risks for people and their activities. These natural hazards have caused the death of more than 400 people in the last 65 years and material damage estimated at more than 27 billion EUR. Regional tradition in ETCWs is longer than 100 years, with remarkable results in the domain of biotechnical and technical works. In the last 15 years, the frequency of occurrence and destructivity of torrential floods indicate that it is necessary to achieve a higher degree of coordination among different activities related to the problems of erosion control and torrential floods. Integrated management in torrential watersheds encompasses technical works in a hydrographic network and soil bioengineering works on slopes, within a precisely defined administrative and spatial framework, in order to achieve maximum security for people and their property and to satisfy other demands such as environmental protection, sustainable soil usage, drinking water supply, rural development, biodiversity sustaining, etc. One of the most important elements is the establishment of horizontal coordination in the management of watersheds, including the fields of forestry, agriculture, water management and spatial planning, on the basis of harmonized legislation. In addition, it is necessary to provide stable sources of funding, with long-term investments as the only way to achieve prevention and minimize risks. The consequences of the absence of systematic ways of funding could be seen in the case of Serbia, where in May 2014 for a few days direct damage of more than 2 billion EUR was inflicted, while the recorded negative growth amounted to -1.7%. For the sake of comparison, effective flood protection in Serbia for the 2016 - 2025 period requires an investment of 900,000,000 EUR, i.e. 90,000,000 EUR per year (30,000,000 EUR for defence against torrential floods and 60,000,000 EUR for defence against river floods and inland waters). The absence of effective prevention of torrential floods in the SEE countries/territories imperils the concept of social and economic development, and thereby endangers the safety of several million people.

**A2.5.9 Final provisions: institutional environment of natural resource management**

The institutional arrangements are essential for an effective and coordinated management of natural resources. While this is not a specific diagnosis for SEE countries/territories, it is certainly one of the issues to be addressed in the context of the development of the region. Institutional arrangements comprise the
circles of policy formulation and implementation, but also the realities of administration and shared or scattered responsibilities regarding natural resource governance and management.

While being difficult to shortcut, a central element common to all SEE countries/territories is a fragmented responsibility on natural resources. For instance, different ministries regulating different parts of a resource, may lead to an uncontrolled governance system, sending no harmonised or adverse signals. This holds true for divided responsibilities in forests, e.g. in forest and environmental issues in forested areas, and cross-thematic issues as regards soil and water management. When an institutional and legal framework is fragmented, it is often difficult to find a way through the maze of regulations. While the legal framework often looks impressive in size, non-coordinated policies remain ineffective since their implementation is too complicated or sometimes even contradictory; in fact it is often so, that over-regulating natural resources in detail may lead to a deadlock, where future-oriented solutions are hampered by a too rigid governance system. Indeed, it seems that a command and control system that is not fully enforced by the respective implementation bodies creates adverse effects as aspired by top-down policies and institutions. In particular, in federal and decentralised countries in regions, an effective implementation requires coordination of political goals and administration bodies, enforcement of local population and responsible natural resource managers, participatory planning instruments, and the combat of illegal practices in land and natural resource use. For instance, uncontrolled spatial planning and land use is still one of the major reasons for unwanted land use change and loss of soil, water protection and biodiversity in the region. Hence, a coordinated governance of natural resources is both essential for maintain the environmental assets and ecosystem services in SEE countries/territories to maintain the opportunities for rural development and creating economic niches as discussed earlier, but also to reach a closer proximity to EU legislation, policies and provisions as outlined in the following chapter.
CHAPTER A3
Overview of the EU policies for management of the Forestry, Water and Soil Resources

This chapter provides a short overview of the main EU policies in relation to forest, water and soil resources. It addresses both legally binding and non-binding requirements the member countries, as well as EU acceding and EU candidate countries are required to implement or consider to follow to become an EU member. Furthermore the status of transposition and implementation of EU legislation and policies with regards to forests, water and soil in the SEE countries is being provided in the second sub-chapter.

A3.1 EU Forest related policies and instruments

Forest policy in the European Union is governed by the EU Forest Strategy, which was published in 2013. This strategy has eight priority areas:

1. Supporting our rural and urban communities.
2. Fostering the competitiveness and sustainability of the EU’s forest based Industries, bio-energy and the wider green economy.
3. Forests in a changing climate.
4. Protecting forests and enhancing ecosystem services. Improving the knowledge base
5. What forests do we have and how are they changing?
6. New and innovative forest and added-value products. Fostering coordination and communication
7. Working together to coherently manage and better understand our forests.
8. Forestry from a global perspective.

The strategy aims at balancing forest functions and the provision of ecosystem services now and in the future, as well as to provide a basis for a competitive forest-based sector. Albeit displaying a non-binding political nature the strategy takes a more holistic view on forests through its notion of sustainable forest management. The EU forest strategy also links topics with regards to agriculture and rural development to biodiversity conservation and climate change adaptation as well as energy and global forest policy. In 2015 a multi-annual implementation plan of the new EU forest strategy was published by the European Commission. It contains a larger number of actions in order to implement the new EU forest strategy for the time period 2015 - 2020.

Competences to develop a common EU wide legally binding forest policy does not exist in the European Union (Pülzl et al. 2013). However, through its competences in agriculture, trade, environment, climate action and energy a number of important forest related legislation and policies were developed since its beginning (Wydra, 2013):

Agriculture and Rural development /IPARD

Starting from the agricultural and rural development policies, the Common Agricultural Policy (CAP) is most important for forests in the European Union since a large number of subsidies are distributed based on this legislation. Currently the CAP 2014-2020 pursues three long-term objectives: sustainable management of natural resources and climate action, a balanced territorial development and a viable food production.
During the Agenda 2000 reform the CAP was structured along Pillar 1, “Market and Income Support Measures” and Pillar 2, “Rural Development”. The second pillar mainly grants direct funding for forests (Angelstam and Lovric, 2014). CAP supports farmers and rural development alike: Two types of interventions are granted in this context: direct payments and market measures. Direct payments (70% of the overall budget spending) are aimed at directly contributing to farm income. 30% of this spending form (Regulation, 1307/2013, 1308/2013) is linked to the provision of public goods (e.g. soil quality, biodiversity and carbon sequestration). Funding is offered in relation to six priority areas among which the following two are most relevant to forests: priority two - enhancing the viability and competitiveness of all types of agriculture, and promoting innovative farm technologies and sustainable forest management; and priority four - restoring, preserving and enhancing ecosystems related to agriculture and forestry). Countries are asked to develop their own rural development programmes where priority measures are to be chosen and displayed. With regards to pillar two (Regulation, 1306/2013, 1305/2013), all rural development programmes are legally required to spend 30% of the funding for environmental and climate change aspects. This is important for forests since it relates e.g. directly to forestry measures, areas of natural constraints and the birds and habitats directives (Natura 2000). As regards market measures, the European Commission can use those in case of market failure and fall in prices.

A larger number of rules linked with agriculture and rural development are directly applicable in the member states. For acceding countries, this means setting up a paying agency as well as management and control systems (e.g. Integrated Administration and Control System). Furthermore, capacities for the implementation of rural development programmes have to be built up. Countries will also be required to apply legislation on direct support schemes as well as the implementation of the common market organisation for agricultural products (with regards to forests e.g. plants and seeds), which also may imply the reform or creation of adequate administrative structures. In many cases albeit not all, countries will be able to choose the competent authority that is in charge of implementing requirements by themselves.

The Instrument for Pre-accession Assistance (IPA) is meant to support acceding countries through financial and technical means to perform economic and political reforms. Currently for the time period 2014-2020 IPA II is operative. Among its beneficiaries are Albania, Bosnia and Herzegovina, Macedonia, Kosovo*, Montenegro, Serbia and Turkey. Country strategy papers for each beneficiary are prepared for this 7-year period. The latest reports from 2016 show considerable progress in all countries albeit not uniformly.

**Trade**

Since illegal logging creates a substantial problem for trade in wood products, the European Union promotes the integration of the notion of sustainable development also in international trade. Therefore, it has created the EU Action Plan for Forest Law Enforcement, Governance and Trade (FLEGT Action Plan) in order to prevent the import of illegal wood and related products into the EU. In order to implement this action plan outside the Union, wood producing countries who aim at exporting those products to the EU agree to Voluntary Partnership Agreements (VPA) with the EU. They are based on national legislation. Those ensure that wood is logged legally and that this can be traced back. Six countries have signed such agreements so far and Indonesia is already issuing a FLEGT license. A large number of other countries in Africa, Asia and Central and South America are currently negotiating those kinds of agreements with the EU.

To complement the FLEGT Action Plan, the EU Timber Regulation (Regulation 995/2010) came into effect in 2013. According to this regulation, wood importers and traders are obliged to know the source of any wood or forest product, which they are buying to be able to ensure legal compliance when entering the EU market. Together those rules aim to prevent the illegal import of wood and forest products into the EU. In case a CITES permit and a FLEGT license are used, they are considered as compliant with the required measures to take. Countries that want to import wood and wood/forest products into the EU will have to follow the guidance published by the European Commission in 2013 and be able to trace the legality of the wood/forest product that they aim to import. It requires operators to apply “due diligence” as well as to use a due diligence system. Traders need to also keep records of suppliers as well as customers.

A Commission document explains the provisions of the EUTR and obligations for operators. Rules vary with
regards to how the wood is made available (harvested inside/outside) in the EU. This guidance document was updated in 2016 due to a more recent review (Rivera Leon et al. 2016). Since however the EUTR requires a proof of legality before being able to sell a product in the EU market, companies or vendors have to get a verification of legality and cannot follow the business-as-usual approach.

**Plant health and propagating material**

The main aim of related EU legislation is to protect food and feed safety derived from plants in order to prevent the harmful introduction and spread of pests and diseases within the Union. Further, it aims to regulate trade of plants and plant product within and outside the Union in accordance with international obligations and standards. With regards to the EU plant health legislation Council Directive 91/414/EEC, Council Directive 2000/29/EC, Council Directive 1999/105/EC, and Regulation (EC) 396/2005 were the most important ones (Pelli et al. 2012) in the past. However, in the meantime the European Commission has identified the need to harmonise legislation further. The Forest Reproductive Material Directive 99/105 and eleven other directives on plant reproductive material were suggested to be merged in 2013. However, according to Bouillon et al. (2015) the European Commission is expected to not include after all the forest reproductive material directive into this package, but according to them related control activities will without much doubt be integrated into Regulation 882/2004. Controls will therefore in the future follow a risk-based approach for food security.

**Phytosanitary measures**

The EU phytosanitary policy lays downs rules for internal trade in the Union and the introduction of products from third countries to safeguard public health. No veterinary and plant health checks exist at internal EU boarders, but a common regime is being applied at its outside boarders. Hygiene aspects are covered in relation to the protection of plants are also by EU legislation.

Principally the candidate countries are required to implement the related EU legislation as well as put all required administration in place to avoid the import of pests and diseases. Regulated articles require certificates. For instance wood packaging companies will have to meet both requirements of the country of origin and the destination country. In case plants or plant products are exported to the EU, they will have to be accompanied by a plant-health certificate, undergo customs and phytosanitary inspections as well as register in the official EU register. Additional requirements may have to be met with regards to seeds and plant propagating material (see marketing of forest reproductive material above).

**Natura 2000**

The Natura 2000 network is composed by the Birds Directive 2009/147/EC and the Habitats Directive 92/43/EEC. Both are among the most important EU legislation for nature protection. Around 30% of all sites are composed by forests or afforested habitats. Additional 30% are containing woodland parts and species. Different measures to protect those species apply. They range from strong conservation aims with minimal invasive measures to normal forms of management depending on the habitat and species in question. Candidate countries as well as member states are required to propose Natura 2000 sites for protection.

**Others**

Older legislation as regards air pollution and forest fire prevention as well as control are not in force anymore. The Forest Focus Regulation 2152/2003 has replaced them, but run out in 2006. The EU Solidarity fund still offers financial means to deal with damage caused by disasters.
A3.2 EU Water related policies and instruments

The Water Framework Directive 2000/60/EC (WFD) was adopted in the year 2000 and is complemented by other, more specific EU laws. For example the Floods Directive 2007/60/EC, the Groundwater Directive 2006/118/EC, the Bathing Water Directive 2006/7/EC, the Drinking Water Directive 98/83/EC, the Urban Wastewater Treatment Directive 91/271/EEC, and the Nitrates Directive 91/676/EEC. The WFD does not only manage and protect water nationally, but goes beyond political boarders to ensure good water quality in cooperation with neighbouring countries, which share rivers. Member countries were asked to draw up river basin management plans (RBMPs) for the currently 110 river basin districts. Furthermore, other goals include reaching a good ecological and chemical status of the bodies of surface water as well as a good status of the groundwater (good chemical and quantitative status). The WFD classification system for surface water includes five categories (high, good, moderate, poor, bad) which member countries have to assess. For assessing the chemical status, quality standards were drawn up. Public participation of citizens is also being asked for to achieve public support. The Commission monitors the implementation progress through drafting implementation reports and progress reviews. Since flood risks, but also water scarcity and droughts occur more often, the EU Floods Directive 2007/60/EC required member states to prepare flood risk assessments for all its river basins as well as flood hazard maps. The first management cycle for the WFD ended 2015. The next one will end in 2021 respectively 2027 for meeting all remaining policy objectives. A large number of guidance documents exist that shall support member countries but also candidate countries in the implementation of the related legislation to meet all policy objectives (http://ec.EURpa.eu/environment/water/water-framework/facts_figures/guidance_docs_en.htm).

The Nitrates Directive 91/676/EEC aims to prevent water quality through avoiding the pollution of ground and surface waters by nitrated from agricultural sources. The aims is to promote good farming practices. Also the Nitrates Directive forms part of the WFD.

The Drinking Water Directive 98/83/EC relates to the quality of water intended for human consumption to protect human health. Based on this legislation currently 48 microbiological, chemical and indicator parameters are monitored and tested on a regular basis. Member states as well as candidate countries can put in place more severe requirements, but not adopt lower standards. A revision of the Drinking Water Directive has been put in place and a Commission proposal is expected for the end of 2017.

The Urban Wastewater Council Directive 91/271/EEC was adopted in the beginning of 1990s to protect the environment from urban waste water discharges as well as discharges from certain industrial sectors. It regulates the collection, treatment and discharge of domestic waste water, the mixture of waste water and the waste water from certain industrial sectors included in the annex III of the Directive.

A3.3 EU Soil related policies and instruments

In the year 2006 the European Commission adopted its Soil Thematic Strategy (COM 2006/231) that included also a proposal for a Soil Framework Directive. However the member states did not agree to this legislation and in April 2014 the Commission decided to withdraw its proposal. The commitment to soil protection is still one if its aim. In the seventh Environmental Action Programme it is clearly stated that sustainable management of soil is equally important as its protection and the remediation of contaminated sites. In 2012 the European Commission reported on the implementation of its Soil Thematic Strategy (COM 2012/46). The Soil Thematic Strategy foresees setting out a framework for action on awareness raising, research, integration of soil protection and a proposal for a framework directive that was withdrawn later. A recent study (Frelih-Larsen et al. 2017) examines all relevant EU policies in relation to soil management, protection and remediation of contaminated sites. It concludes that like for forest policy a number of EU key legislation have an impact on soil, e.g. pillar 1 and 2 of the rural development regulations, the EU Forest Strategy, Nitrates Directive, Natura 2000 legislation, Water Framework Directive etc.

Other EU legislation that somehow relates to soil exist as they aim to prevent acidification (e.g. the National Emission Ceilings Directive), as well there are those that aim to control emissions from installations both

### A3.4 Meeting EU requirements in the SEE countries/territories

Currently Albania, Macedonia, Montenegro and Serbia are official candidate countries who applied for EU accession, while Bosnia and Herzegovina and Kosovo* are potential candidate countries. This said the candidate countries have to comply with EU legislation and rules, while potential candidate countries also aim at approximating their legislation and policies.

**With regards to EU forest-related legislation all SEE countries/territories aim at implementing required provisions:**

- **Albania** has transposed the trade-related forest legislation, but due to corruption the impact in practice has been minimal. Its forest law in addition to other national legislation directly refers to EU directives with regards to the marketing of seeds, Natura 2000 and the monitoring of forests. The European Commission (2016a) stated in its report also that five Natura 2000 were to be designated by 2017 as well as since a hunting ban has been beneficial to the protection of its fauna, it has been prolonged for five more years.

To meet the requirements of the EUTR trade legislation in **Bosnia and Herzegovina** and to minimize potential threats to the export-oriented wood-processing companies a EUTR Action Plan for BiH was developed in March 2013. This action plan is also supposed to improve human and institutional capacities as well as to prevent illegal activities and to support forest certification activities. A list of potential Natura 2000 areas was prepared and potential management plans were developed thanks to a donor project. However, according to the report of the European Commission (2016b) nature protection legislation remains to be adopted and implemented. Due to this project the related legal implementation within nature protection laws was supported. With regards to phytosanitary aspects and forest reproductive material needed measures are implemented. However the system of official veterinary and phytosanitary control has not been fully harmonized so far. With regards to plant health protection within FBiH a rulebook was adopted that also identified the competent authorities in charge of reporting and forecasting activities.

- **Kosovo** refers in its draft law on forest explicitly to the EU legislation on forest reproductive material and the prevention of trade in illegally harvested timber and timber products to meet required obligations, but this has not be finalised so far. With regards to Natura 2000 no respective areas were selected so far despite the fact that related legislation and policies have demanded it. The report of the European Commission (2016c) stated that the alignment with its legislation is only in its initial status as no effective protection for sites is in place either. They also conclude that with regards to phytosanitary aspects more work needs to be done.

- **Macedonia** implemented the Natura 2000 legislation as the legislation became part of it nature protection legislation, but the process of designating related areas has also not started so far. So far the EUTR and its requirements were not implemented, but a debate that also refers to certification of forests has started. Finally Macedonia for becoming a member of the World Trade Organization (WTO) has also harmonized its sanitary and phytosanitary measures in accordance with international law.

- **Serbia** the responsibility for the adoption of required EU legislation is shared between the Directorate of Forests, the Phytosanitary Directorate, the Veterinary Directorate and the ministry in charge of environmental legislation. The actual status of the implementation of the EU legislation is however currently unclear despite the fact that some legislation e.g. with regards to forest reproductive material is already in place. In addition since Serbia is currently in the process of becoming a WTO member it applies related phytosanitary and sanitary agreements also, but more could be done. The Natura 2000 legislation was not fully transposed as gaps (e.g. huntable/ non huntable birds) exist. Therefore the latest report from the European Commission (2016e) assesses its implementation status as moderate.
Montenegro has not implemented a due diligence system as required by the EUTR legislation. Veterinary and phytosanitary measures are in place and according to the report of the European Commission (2016f) Montenegro has made good progress, but more needs to be done in this area (e.g. improving its administrative capacity).

Already in 2007 a legislation on forest reproductive material was adopted based on EU requirements, but further improvements were suggested. Despite the fact the Montenegro has adopted relation Natura 2000 legislation, the report of the European Commission (2016f) suggests for example a streamlining and resourcing of its institutional framework for the designation and management of future sites.

With regards to the implementation of the EU water legislation SEE countries/territories have taken the following measures:

Albania transposed the requirements of the EU water framework directive into its legislation on integrated water management. With regards to the floods directive its transposition is in an advanced status. According to the report of the European Commission (2016a), the legislation on water quality as well as the administrative capacity for water management are considered weak. For instance the implementation of the EU drinking water and groundwater legislation is insufficient as well as the development of river basin management plans is not completed (only one exists so far).

In Bosnia and Herzegovina, BiH, FBiH and RS transposed the EU water framework directive. Significant efforts with regards to other EU water legislation were made. For instance the transposition level of the water framework directive, the urban waste water treatment directive and the drinking water directives was achieved. According to the report of the European Commission (2016b), a country wide strategy and investment plan for water management is lacking. It was however also acknowledged that the FBiH and RS have implemented both a water management strategy.

In Kosovo* the implementation and transposition of EU water legislation has advanced only in some areas. While good progress was achieved with regards to the drinking water directive, others (e.g. water framework directive, directive for polluted urban waters, nitrate and flood directives) are still lacking behind. Despite the fact significant progress was made because of the adoption of a new law on water, further efforts are needed. The report of the European Commission (2016c) states that no strategy and action plan for water protection has yet been adopted nor a river management authority been established. In addition it was said that untreated sewage presents a serious threat to groundwater. Different responsibilities shared among different ministries and bodies in charge make coordination a crucial need for strengthening the implementation of EU requirements.

With its law on water Macedonia has transposed several EU directives that relate to water quality and management. River basin plans have all been prepared and the transposition of the water framework directive has reached a satisfactory level albeit not being fully implemented so far. With regards to the flood directive only a competent authority was set up, but not further requirements are implemented yet. For instance flood hazard and risk maps for all river basins are missing, no coordination of the WFD and FD is in place etc. According the report of the European Commission (2016d), no system for monitoring water quality and quantity is in place as well as untreated urban waste water are the main pollution source.

In Serbia different pieces of legislation and the currently being prepared national water management strategy (expected for 2017) aim at transposing the requirements of the EU water framework and EU flood directives. However the transposition has not been fully achieved so far as a number of bylaws and decrees are expected to be issued too. With regards to the flood directive detailed flood risk and flood hazard maps are available. Like for other SEE countries the report of the European Commission (2016e) sees untreated sewage as a main source of pollution. It was also emphasised that surface water and groundwater monitoring needs to be further improved as well as the Commission asked for a strengthened administration, enforcement and inter-institutional coordination.

In Montenegro a national strategy and action plan for meeting the requirements of the EU acquis with regards to topic of environment and climate change was adopted. The responsibilities for water-related
legislation are shared among the ministry of agriculture and rural development and other ministries such as the ministry of tourism and sustainable development and the ministry of interior. Therefore a water working group was established. The report of the European Commission (2016f) assessed the transposition of the EU water legislation as rather limited. Not only that the national strategy and action plan on water protection have not been adopted yet, river basin management plans were also not designed (expected by 2020), but their preparation has just started. A system for monitoring water quantity and quality is still not in place and river management authorities not yet operational.

**With regards to the protection and management of soil the following activities have been implemented in the SEE countries/territories:**

In Albania some progress was achieved with regards to awareness raising and the integration soil protection and its sustainable use into other sectoral strategies for instance in the field of agriculture, forestry, water management and industrial management. No related legislation is in place so far. Research activities exist, but only few related to soil degradation, but do not cover the national level. Monitoring the status and quality of soil is not being performed either.

In 2005 Bosnia and Herzegovina and its entities RS and FBiH signed a memorandum of understanding with the European Commission as regards mutual cooperation and support for the development of a national systems for environmental monitoring. Topics addressed in the EU thematic soil strategy are not included in the national legislation in place. Only the issue of awareness raising and research are addressed in related strategies.

In Kosovo* no specific soil regulation exist, despite the fact that the law on forests indirectly also addresses soil.

Macedonia currently prepares a national action plan to combat land degradation and desertification that somehow also addresses soil, but like in Kosovo* no other legislation is currently in place that directly refers to it.

Contrary to the EU, Serbia has adopted a law on land protection. This included the provision of a rulebook to ensure systematic soil quality monitoring, indicators for risk assessment for identifying soil degradation and a methodology for developing a remediation programme. In addition contaminated sites are included in the European pollutant release and transfer register. Furthermore Serbia monitors the state of erosion and organic carbon in soils.

Finally Montenegro has developed two strategies (one regarding the transposition and implementation of the EU environmental acquis and one regarding the development of agriculture and rural areas) that also have as main objectives the long-term management of water and soil. Specific soil legislation however has not been developed.
CHAPTER A4

Recommendations for integrated management of the natural resources in SEE

(1) Pathways towards developing the natural resource sector

The forest sector should be understood in a broader definition of a forest-based sector, that entails the stages from primary production of wood and NWFP, the provision of ecosystem services, but also secondary and tertiary activities. In such a value-chain approach, it is important to understand where value added is generated, how it contributes to rural development, and intra- and intersectoral cooperation can foster the development of the forest-based sector.

Important steps in this direction comprise:

- Increase the profitability of forest enterprises: although a strong social component of forest enterprises is acknowledged, they are largely unprofitable. Streamlining of administration and management structures and explore revision strategies for state forest enterprises (e.g. strengthen responsibility of personnel, success awards), investments in forest infrastructure and technology, a stronger shift towards adaptive management strategies, and a shift from quantity to quality of forest products and services are recommended.

- Improve the knowledge base for forest, soil and watershed management: modern monitoring instruments are prerequisites for a sustainable management of forest resources. Currently, national forest inventories are still widely lacking. On the other hand, rigid planning instruments at enterprise level hamper a dynamic, future-oriented forest management. Implementing novel, prospective management concepts can help overcome maintaining just a status quo, but help unravelling the potential of multi-functional forestry satisfying and harmonizing the growing demands of the society. Further, an integrated watershed management requires a state-of-the-art knowledge base and modern instrument for watershed planning, prognosis, and risk assessment.

- Building up new value creation opportunities: exporting raw materials such as round wood or NWFP raw material (e.g. frozen mushrooms) would leave major parts of value creation to outside the region. Also, using major quantities of wood for self-subsistence heating may be overcome by new bioenergy strategies including community energy plants. New trends such as greening of society, healthy food, or eco-tourism can build major opportunities to diversify the sector, but need strategic and political support and require national and international investment in a cross-sectoral approach. The empowerment of communities and decentralization of planning and managing these activities can be fundamental for its success.

(2) Towards new approaches of land use planning

Land is a scarce resource, while being instrumental for the future of the region’s countries/territories. Uncoordinated spatial planning is a major source for loss of productive land, and inefficient management of its resources. On the other hand, decrease of population and land abandonment impose a major obstacle to rural development.

Recommendations for land use planning comprise:

- Improve and harmonise spatial planning: inconsistent spatial planning, uncontrolled assignment of land use permits, split responsibilities, low enforcement of rules and regulations and incomplete land
Natural Resource Management in Southeast Europe: Forest, Soil and Water

restitution create long lasting impacts on the maintenance of proper soil and ecosystem qualities. Consistent and rigid spatial planning instruments on cross-sectoral level need to be installed in order to secure the fertility of ecosystem and land.

- Invest into natural resource management instruments such as forest development plans, flood risk management plans, flood hazard and risk mapping, soil maps, and harmonized monitoring and inventory systems in general including a harmonised methodology for determining the soil loss at the regional level.
- Clear contaminated and mined sites: the SEE is still heavily contaminated with toxic waste and land minds, which renders major parts of land inaccessible and natural resource threatened and unusable. Priorities have to be given to clear temporal plans how to improve this situation affecting forest, water and soils alike, while seeking international support and regional cooperation.
- Reduce land abandonment: land abandonment is a major source for uncontrolled and unsustainable land and natural resource use. Hence, investment in rural areas are key to maintain the capacities of both resources and people in the region. European programmes such as IPARD create to opportunities for support while improving the compliance with the EU acquis communautaire simultaneously.
- Support modern communication technologies and web-access infrastructure in rural areas for an integrated planning of forest, soil, and water resources.

(3) Ecosystem services as a role play for integrated natural resource use

The concept of ecosystem services carries an integrated view on natural resources as to the benefit of ecosystems and human societies. It is integral that natural resource management seeks synergies in their provision instead of trade-offs outweighing one against the other.

This requires:

- Create cross-sectoral platforms for policy- and decision-making: fragmented decision-making does not respond to the integrity of ecosystems and their provided services. If forest, water and soil are divided in political and administration responsibilities, an integrated management of natural resources is impossible. New modes of natural resource governance such as inter-ministerial exchange fora, regional, cross-national fora for an ecosystem approach, and integrated planning tools on the ground can foster a better integration and help diminish perverse incentives for land and natural resource use.
- Investigate new avenues for marketing and payment for ecosystem services: to gain means for fostering ecosystem services income has to be generated both from private and public side. Mechanisms have to be sought that support both marketing of ecosystem services on market basis such eco-tourism, contractual nature protection, and instrument for securing the maintenance of non-marketable services and public goods (such as water or biodiversity). EU instruments such as Natura 2000 are worth following and important for compliance.
- Find a proper zoning of ecosystem services: defining hotspots for specific ecosystem service provision may support proper planning mechanism and directed and efficient funding of target amenities and commodities.

(4) Towards new level of business development

Developing natural resource use and the connoted sectors requires private initiatives and a motivating business environment that helps contributing both to rural development and advanced industries solutions ready for investment.

Major steps comprise:

- Improve law enforcement and legal security: for any economic activity safeguarding of legal standards, investment security, and legal certainty is fundamental for its happening. It is of prime importance to fight illegal practices such as illegal logging, in transparent land permit rights, or erratically changing legal prescriptions often hand in hand with corruption that hamper the stimulus for initiative and investment.
- Develop capacities and strategies for non-primary sectors: the increasing scrutiny on natural
resources as major driver of a new economy implies that there are ample opportunities for value creation. Vertical cooperation among sub-sectors, new niches and brands for value-added products instead of raw material export can help to make natural resources a driver of bioeconomy in the region, including processed and advanced wood products (e.g. furniture, wood-processing industries, bio-chemicals, medicinal products) while trying to achieve keeping workforce and capacities in the region

- Create a business-stimulating environment: small and medium enterprises are the very backbone of today’s societies. It is key that administration burdens are not to halt such a development, but to cast programmes for business creation in particular in rural areas. This implies horizontal and vertical cooperation along value chains, produces-processer alliances, and marketing clusters that are attractive both nationally, but also on regional and EU level.

(5) Private land owners in the focus

In the wake of restitution and privatization of land, a lot of land owners stay disconnected to knowledge, skills, and motivation to properly manage their land. While state-owned land appears to be managed very rigidly, private property is largely unknown, but often imposed with top-down state control.

In order to activate the full potential of private land, the following is recommended:

- Support the organization of private land owners: examples show that a stronger organization of land owners lead to an increasing motivation to manage land properly and according to given standards. Cooperation may help to go beyond the marginalities of individual owners in terms of capacities and marketing potentials, to stand in for their interests, and to take up responsibilities for their own right, but also societal benefits.
- Increase the amount of actively managed land: only when activating private land owners, it is possible to pursue a guided modus operandi of desired land and natural resource management. Effective instruments between the legislative and administrative power and private land use (e.g. common fora, incentives) have to be installed to grant an integrated touch upon natural resources such as forest, water, and soil management.
- New forms of communications to be installed: state should not hide behind a top-down order policy but promote an active exchange with private land order in order to achieve public policies. This implies that state bodies know who private owners are, what their interests are, and what the need to comply with national standards. It is important to install clear modalities of communication, stakeholder exchange platforms that bring together more than closely sectoral communities.

(6) Resilience is an integral concept to natural resource use

A frozen view on natural resources is not adequate in these days. Global trends such as global warming may impose pressure on SEE ecosystems beyond average. This is not only important for the productivity of land, but also the maintenance of its biodiversity and water treasures.

Hence, the following is recommended:

- Take action in climate change adaptation and mitigation: climate change strategies and instruments for proper implementation are more than paper work. An integrated view on natural resource management needs operational plans and bring clarity beyond the void of uncertainty. Awareness-raising campaigns (both in the public but also administration), incentives for management amendment, and the promotion of concrete pathways how forest, soil, and water resources can be maintained in a changing environment.
- Develop clear actions plans: response to climate change and fostering resilience of ecosystems is contrast to reactive measures. It requires clear strategic planning how to reduce soil erosion, and how to prospectively handle extreme events such as floods or forest fires. Prevention happens most likely better within regional cooperation, where downstream effects of floods, soil sealing, and retention areas are commonly planned, and where forest fire combatting is jointly organized.
- Foster integrated, inter-communicating monitoring systems for forest, soil, and water incl. environmental status.
- Foster investment in water infrastructure and strategies for a higher efficiency of water use
• Improve science uptake: hesitation against novel evidence in active natural resource management is fiendish to adaptive management approaches. New ways of science-policy and science-practice transfer have to be installed to go beyond well-trodden, traditional concepts of natural resource management. In this respect, new interfaces between academics, administration, and practitioners have to be sought and facilitated, also with political support.

(7) Institutional framework matters
A well-established institutional framework with a proper representation of all actors involved is essential when talking about an integrated management of natural resources. It is called to avoid contradicting policies, low level of policy implementation, and parallel structure in administration and governance. Respective development of an institutional framework is also a key factor for securing compliance with EU standards and policies.

The following may be recommended:

• Streamline policy instruments and management planning of natural resources
• Strengthen synergies in the administration frameworks of SEE countries and clear, non-competing competences in the field of natural resources. Synergies might most likely lead to higher efficiency of actions, and less competing resource investments. An integrated management of natural resources requires that responsible for forests, soil and water collaborate and develop common communication and exchange for a for identifying priorities and common action. Integrated RD programmes reveal ample opportunity to support such activities, with agri-environmental measures specifically implemented.
• Support new modes of participation in the political arena around natural resources in a cross-sectoral manner.
• The benefits of integrated natural resources have to be made visible to convince all involved stakeholders incl. administrations to increase collaboration and exchange.
• Secure functioning of political decision-making and control, and respective law enforcement
• Support institutional mechanisms for combating illegal logging, and enforcement of a controlling and safeguarding system of illegal logging activities.
• Prospective action and development of structures for compliance with the EU acquis communautaire can achieve internal effects in terms of agenda setting, enforcement of policy goals, and positive effects on ecosystem service provision.
• Professional capacities in administration and institutions can substantially support better access to funding and cooperation in business, R&D, administration, capacity building

(8) Last but not least: capacities and education
Capacity building and education are the main essentials to keep natural resource management vivid in the region. This relates both to academic education but also capacity building and skill development in broader terms. Regarding the first, science-based policy making can lead to better, more consistent, and more transparent decisions. In the domain of forestry and natural resources, smart decisions in a complex, multi-sectoral environment are particularly needed. Hence, it is aspired that policy research makes a difference by providing latest science-based findings and evidences to policy-makers. This transfer shall be multi-lateral, regionally specific, and problem-centred. Regarding the latter, it is important to keep capacities in the regions and help them further develop to be fit for new trends and new demands such as preparing for EU accession and its rules.

• Secure and earmark national funding for education and capacity building in integrated natural resource management and develop career models for academics.
• Capacity building for EU standard implementation and information campaigns within the sectors – knowledge transfer.
• Increase capacities in NRM administration to make them fit for new challenges (e.g. climate change, ecosystem services, cross-sectoral cooperation).
• Secure cooperation with regional and international education institutions and funding mechanisms as well as training and life-long learning programmes.
- Invite international know-how in wood-based industries and forest & water management, and establishment of new trainee programmes, and support respective integrated decision-support systems.
- Support new modes of science-policy exchange that guarantee a better uptake of scientific findings into decision-making and planning.
- Awareness-raising in the broader public on the assets of natural resources in SEE countries, the opportunities connoted, but also the imminent threats (e.g. forest fires, soil loss, drinking water quality, flood, risk) that require corrective action, but also clarifying on issues such as benefit-sharing.
PART B: NATIONAL ASPECTS

RELEVANT TO THE FOREST, SOIL AND WATER RESOURCES IN SEE
CHAPTER B1
Overview of the Natural Resource Management in Albania

Authors: Genti Kromidha\(^2\) and Miriam Ndini\(^3\)

B1.1 Introduction: General Information about the Country

Albania is a relatively small country (28,748 km\(^2\)), located in the southwestern part of the Balkan Peninsula along the Adriatic and Ionian coasts. With a mostly hilly and mountainous terrain, the average altitude of the country is about 700 m.

The new administrative reform in the country has divided the country into 12 regions and 61 municipalities. According to the latest Census (2011) the number of residents in urban areas far exceeds the number of residents in rural areas. This represents a significant change compared to the early 1990s, when about two-thirds of the population lived in rural areas.

In recent years Albania has made a great effort to improve its economic situation and growth rate. In 2014 the GDP was calculated at about 9.96 billion euro (3,443 euro per capita) with the growth rate being around 2%, with projections estimating that it will remain at this modest level for the next few years. The rural areas and the mountain regions are consistently poorer than the rest of the country. The livelihood options in these areas are restricted to agricultural, pastoral, horticultural, forestry, and landscape management related activities.

Albania is now a country with EU candidacy status, set for EU membership. However, the European Council, in line with established practice, will consider the opening of accession negotiations. The European Commission has to assess that the country has achieved the necessary degree of compliance with membership criteria and, in particular, has met the key priorities set out in the Commission’s Opinion. The key priorities include, among other aspects, public administration reform, the rule of law and judicial reform, fighting corruption, addressing property issues, and reinforcing human rights. Pre-accession financial assistance is provided under the Instrument for Pre-Accession Assistance (IPA).

B1.2 Assessment of the Forest Sector

B1.2.1 Forest resources and management

Forests' cover about 37% of the Albanian territory and together with pasture area the coverage is about 54% (INSTAT, 2016). However, one-third of these areas consists of degraded open forest and shrub

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\(^1\) The definition of “Forest” in Albanian legislation differs from the FAO definition in terms of minimum tree canopy cover (30% in Albania Vs 10% FAO) and minimum area size (0.1 Ha in Albania Vs 0.5 Ha FAO).

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formations, which area has increased over the last 25 years (255,900 ha in 1990 to 377,500 ha in 2014). The area of high forest and coppice has reduced (788,800 ha in 1990 to 675,300 ha in 2014).

Forestry, pastures, and crop production are the most important land uses in rural areas in Albania. It is typical in rural Albania that villagers manage both agricultural and forestry resources in diverse agroforestry systems where agricultural crops, trees and livestock are found within the same management unit.

**Forest area by management and protection regime**

The majority (78%) of forest areas in Albania are classified as economic forests, while forests within protected areas (protected forests) cover only 20% (see Table 1). There is only a limited size (2%) of special function forests managed for the protection of important water bodies or other important infrastructures. The high forest cover 42% and coppice forest 32% of all forest areas in the country. Shrubbery covers 24% of the forest area of the country.

Recently, attempts have been made to establish a forest information system. The forest register (cadastre) is digitalized and data from the communal forests and pastures management plans developed under several projects exist in digital format (including maps). However, there is no forest management information system in place yet. Information on forests is scattered and difficult to obtain. This hinders policy formulation since it cannot be based on accurate information and reporting to international partners is difficult.

As regards forest resources (Table 1.2), there are no disaggregated data on annual volume increment. Also, the average annual felling is not disaggregated per forest regime and ownership. The amount shown in the Table 1.1 includes legal harvesting (96,500 m³), harvesting for household needs (mainly firewood) (250,200 m³) and illegal logging (11,800 m³). It should be noted that areas damaged and volumes extracted by households and/or illegal logging are not regularly reported on the forest register (cadastre).
Table 1.2 Growing stock, increment and felling, and (if possible) carbon stock (Source Ministry of Environment 2016)

<table>
<thead>
<tr>
<th>Forest types</th>
<th>Publicly Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 m³</td>
<td>000 m³</td>
<td>000 m³</td>
</tr>
<tr>
<td></td>
<td>m³/ha</td>
<td>m³/ha</td>
<td>m³/ha</td>
</tr>
<tr>
<td>Growing Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Forests</td>
<td>55,252</td>
<td>2,085</td>
<td>57,337</td>
</tr>
<tr>
<td></td>
<td>126.2</td>
<td>143.9</td>
<td>126.8</td>
</tr>
<tr>
<td>Coppice Forests</td>
<td>10,841</td>
<td>656</td>
<td>11,497</td>
</tr>
<tr>
<td></td>
<td>33.1</td>
<td>71.1</td>
<td>34.1</td>
</tr>
<tr>
<td>Total</td>
<td>66,093</td>
<td>2,741</td>
<td>68,835</td>
</tr>
<tr>
<td></td>
<td>159.3</td>
<td>215.0</td>
<td>160.9</td>
</tr>
<tr>
<td>Total annual volume increment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Forests</td>
<td></td>
<td></td>
<td>497.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>766.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.9</td>
</tr>
<tr>
<td>Average annual felling</td>
<td></td>
<td></td>
<td>358.5</td>
</tr>
<tr>
<td>Carbon stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

There are no data about the total carbon stock of Albanian forests. Albania is, however, already implementing a CDM carbon sequestration project. The objective of the Albania Assisted Natural Regeneration CDM Project (registered in 2010) is to generate 22,964 metric tons CO₂ equivalent per annum (for a 20-year period) in temporary Certified Emission Reductions (tCERs) through assisted natural regeneration and reforestation of highly degraded land, which will also lead to enhanced sources of livelihood and incomes in poor rural areas, reduced soil degradation, improved water quality and conservation of biodiversity.

Forest types and ownership by management regime

Until 1990, all forests and pastures were state owned property. After the deep political, economic and social changes of 1990s, three forms of ownership were introduced: state, communal and private ownership. Pastures and forests are significantly degraded as a consequence of the country’s transition to democracy and market economy: forest degradation is mainly caused by human pressure on forest resources through uncontrolled wood cutting and overgrazing but also due to agriculture. Weak law enforcement that followed the transition has led to increased exploitation of firewood resources.

The new reform of the forestry sector, completed in 2016, provides for only two forms of ownership: public and private (Table 1.3). The forests under public ownership are managed mainly (80%) by municipalities, except for forests within protected areas that are managed by the National Agency for Protected Areas (see Figure 1.1). Broadleaf forests (83%) dominate over conifers (16%). Coniferous forests are scattered on both northern and-southwest part of the country (see forest cover map in Annex 1), as well as along the coast. Broadleaf forests are located all over the country with the most viable forest in the northern and eastern parts.
### Table 1.3 Ownership types by forest categories (Source: INSTAT 2015)

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area in hectares (ha)</td>
<td>%</td>
</tr>
<tr>
<td>High forests</td>
<td>437,745</td>
<td>42.0%</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>327,590</td>
<td>31.5%</td>
</tr>
<tr>
<td>Shrubbery</td>
<td>244,968</td>
<td>23.5%</td>
</tr>
<tr>
<td>Total</td>
<td>1,010,303</td>
<td>97.0%</td>
</tr>
<tr>
<td>mixed</td>
<td>16,171</td>
<td>1.55%</td>
</tr>
<tr>
<td>Coniferous</td>
<td>156,861</td>
<td>15.06%</td>
</tr>
<tr>
<td>Broadleaf</td>
<td>837,271</td>
<td>80.39%</td>
</tr>
<tr>
<td>Total</td>
<td>1,010,303</td>
<td>97.00%</td>
</tr>
</tbody>
</table>

### B1.2.2 Forests in support of rural communities

Recently (since 2008) the main development in the forestry sector in Albania has been the complete decentralization of the forest management and transfer of forest management authority over to local government units. This concept has been continuously supported by international donor funded projects (GEF, World Bank, SIDA). The process was completed in May 2016 with the approval of legislation that finally transferred the management authority and previous assets of the forestry directorate to the newly established 61 municipalities. Local authorities, mainly for satisfying their basic needs for firewood and fodder, now manage all forest areas, except those within protected areas.

There are no public forest companies in Albania. Municipalities are in charge of managing their forest resources (see Figure 1.1). Private companies under contract or concession by the owners perform all activities and works within forest areas. The Ministry of Environment still has a Forest Directorate whose task is to develop policies and strategies for the development of the forestry sector. The National Agency for Protected Areas (NAPA), established in February 2015, is responsible for the management of forest areas within protected areas as well as for the forest extension service. The NAPA carries out its activities through 12 Regional Agencies for Protected Areas. The State Environment and Forest Inspectorate is in charge for law enforcement related to forest and forestry activities.
Private forests cover a very limited area yet and their owners are not well organized in associations capable of influencing decision-making. The church is considered to be a private owner and it is not reported separately.

**Employment in the forestry sector**

Previously, the main employer in the forestry sector was the state forest administration. Now this role has been passed on to the municipalities. According to the government decision finalizing the transfer of forests to municipalities, it is required that municipalities will have to employ within their administrations a total of 982 people who will hold positions like forest engineers (404), forest technicians (278) and administrative and other workers (300). These people will be responsible for the management of the forest resources. Not all municipalities have employed all people as required.

So far no official statistics about the number of employees in forest-based industries exists. However, the Table 1.4 (below) provides some data about the number of businesses whose activity is related to forests and wood processing. The table shows a large number of businesses working in timber production and furniture. However, it is important to consider that the majority of these businesses are small, family enterprises with limited production capacities.

### Table 1.4 Number of Forest Related Businesses (Source: INSTAT 2015)

<table>
<thead>
<tr>
<th>No.</th>
<th>Main Economic Activity</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forest harvesting</td>
<td>128</td>
</tr>
<tr>
<td>2</td>
<td>Timber and cork production (except furniture), straw and whickering products</td>
<td>582</td>
</tr>
<tr>
<td>3</td>
<td>Paper and paper related products</td>
<td>131</td>
</tr>
<tr>
<td>4</td>
<td>Furniture</td>
<td>957</td>
</tr>
</tbody>
</table>

**B1.2.3 Fostering competitiveness of the forest sector and added-value chains**

The main income of the forestry sector comes from the sale of timber, non-timber forest products (NTFP), the issuance of hunting permits and the leasing of territories. Since there are no public forest companies all forest activities and interventions are conducted by private businesses under contract with the forest service. Investment comes mostly from the state budget and various projects. Recently the state budget has invested in afforestation and rehabilitation measures in some forest areas as well as fighting forest pests and diseases, such as the Pine Caterpillar. However, most of the budget goes for covering salaries and operational costs.

**Income structure and revenues of state forest companies**

Data for 2015 are missing due to the structural changes that have taken place in the forestry sector. Since the forest service is not an enterprise there are no related costs and no profit is generated. All revenues go to the state budget. As shown in Table 1.5, the majority share of the revenues is derived from wood sales. The data show a drastic decline in wood sale revenues that can be attributed to the uncertainty surrounding the sector’s development, due to the forestry sector’s awaited reform. The biggest share of the other revenues is derived from hunting. However, this changed in 2014 when a hunting ban has been enforced. The hunting ban was reintroduced in 2016 and will be in place for a period of five-year. The hunting ban has had no impact on forests since the number of game is still low.
Public and international funding and investments

During the period 2010-2014 the state budget (see Table 1.6) has invested 3.693 million euros in afforestation and about 1.168 million euros in forest thinning activities with an annual average of about 1.215 million euros.

Table 1.5  Income structure and revenues of forestry activities (000 €) (Source: Ministry of Environment 2016)

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Revenues</td>
<td>3,187.20</td>
<td>903.20</td>
<td>No data-</td>
</tr>
<tr>
<td>Revenues from wood sales</td>
<td>3,027.4</td>
<td>889.00</td>
<td>No data-</td>
</tr>
<tr>
<td>Other revenues *</td>
<td>159.80</td>
<td>14.20</td>
<td>No data-</td>
</tr>
<tr>
<td>Total costs</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Gross profit/loss</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.6  Public and international investments/funding (Source: Ministry of Environment 2016)

| Public funding (e.g. subsidies) in 000 euros | 3693 (000 euros) | 1168 (000 euros) |
| Harvesting infrastructure | No investment | No investment |
| Road infrastructure | No investment | No investment |
| Human resources and qualifications | No public funding on human resource development | |
| others (define) | | |
| afforestation | | |
| forest enhancement | 3693 (000 euros) | 1168 (000 euros) |

The most important project related to forests is the Environmental Services Project (ESP) with an overall value of approximately 17 million euros. The most important outputs of this project include the new forest inventory, a forest information system, and the registration of all forest properties. It also includes a grant scheme for small scale forest related activities.

Forest products and services

The main forest product is wood for sale and as shown in Table 1.7, it is the major contributor to the forest service revenues. Additionally, forest areas provide a variety of NTFP (medicinal plants, mushrooms, berries, pine cones, etc.), which in 2014 contributed 10,000 euro in revenues.

Table 1.7  Quantity and value of marketed goods and services

<table>
<thead>
<tr>
<th>Quantity and value of main marketed goods (incl. NWFP) (up to 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wood sale</td>
</tr>
<tr>
<td>NTFP (different type of products on different quantities)</td>
</tr>
<tr>
<td>Value of main marketed forest ecosystem services (up to 5)</td>
</tr>
</tbody>
</table>
With regards to forest services, no marketing efforts are made in regard to products and services; there is not any marketed ecosystem service as yet. The Environmental Services Project supports the establishment of a Payment for Ecosystem Services Scheme for erosion control on important hydrological basins (hydropower and water supply).

**Contribution of the forest sector to the GDP**

The contribution of the forest sector to the GDP is not calculated separately. The contribution of forestry to the GDP is agglomerated with that of agriculture and fishing. The same is true for the contribution of wood processing and paper industry, which is calculated as part of the overall industry sector. Considering this, it is hard to say how much the forestry sector generates by itself, thus making it difficult to determine its contribution to the GDP.

**Trade balance**

Albania imports most of its wood supply, apart from firewood. However, this will also change in the near future since the enforcement of the 10 year forest harvesting ban. The harvesting ban affects all commercial forest harvesting activities. Only collection of firewood for households and public institutions is allowed. Recently (since 2012) some export of wood pellets, which is a new product for the Albanian wood processing industry, has taken place. The development of this product could definitively improve the heating efficiency of household stoves and reduce the overall demand for firewood. The main exported products include firewood, charcoal and sawn wood. The main imported products are wood-based panels and sawn wood (see table 1 and 2 in the Annexes).

**Illegal logging**

Illegal logging is neither new nor uncontested by the government. Illegal activities became a common feature in the years prior to social economic reform, reaching a peak in 1997 (see Figure 3) and continuing to this day.
The official statistics (see Figure 3) on illegal logging show, however, a decreasing trend since 1997. The peak was reached in 1997 when more than 500,000 m$^3$ of illegal logging was recorded (INSTAT 2008). According to government statistics, the total volume of illegal logging is about 15% of annual felling. However, the actual volume of illegal or unregulated logging, however, probably exceeds legal harvest by a factor of ten. This can be concluded from the discrepancy between the official data on firewood supply and actual consumption. The largest consumer group of firewood is households; but public institutions, charcoal and lime producers also consume significant volumes of firewood. The total firewood consumption by different sectors is estimated at 2.55 million m$^3$/year. This amount is taken away from the forest in an unregulated and illegal manner. This is also evident in changes of the growing stock every year (see Table 1.9). In the last 15 years changes have been negative although the government maintains that annual felling has always been below the annual allowance to cut.

<table>
<thead>
<tr>
<th>Year</th>
<th>Area (000/ha)</th>
<th>Growing stock (000/m$^3$)</th>
<th>Difference (000/m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1,031.6</td>
<td>82,820</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>1,043.6</td>
<td>79,883</td>
<td>-2,937</td>
</tr>
<tr>
<td>2010</td>
<td>1,043.0</td>
<td>76,504</td>
<td>-3,379</td>
</tr>
<tr>
<td>2013</td>
<td>1,040.9</td>
<td>76,244</td>
<td>-260</td>
</tr>
</tbody>
</table>

In order to address illegal logging and forest degradation processes, in February 2016 the Albanian government introduced a 10-year ban on forest harvesting and the trade of forest products for any commercial purpose. In order to enforce the moratorium, the government established a temporary task force called the “Green Guard”, whose main task is to prevent any damage to forests, be they public or private. The Deputy Minister for the Environment chairs the “Green Guard” and its coordination panel consists of Deputy Ministers of Defence, Internal Affairs, and Finance. The Green Guard has its operational structures in all regions consisting of representatives of the State Police, Military Police, State Inspectorate
for Environment and Forests, and Tax and Customs Office Inspectors. The approval of the ban has halted all commercial operations of all private companies in forests.

B1.2.4 Protection of forests and enhancing ecosystem services

Forest health and damages

The only data reported about forest damages are those related to illegal logging and fires (see Table 1.10). Forest health should be monitored by the National Environment Agency and reported in the Annual State of Environment Reports. However, there are no statistical data about the spread of insects and diseases in forest areas. In 2015, the Ministry of Environment undertook a campaign to combat pine caterpillar in different regions of Albania, but the results are dubious.

Table 1.10 Forest damage in the last five years (Source: NEA 2013, INSTAT 2015)

<table>
<thead>
<tr>
<th>Types of forest damages</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Total for the period 2011-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human made (m³)</td>
<td>9,716</td>
<td>11,286</td>
<td>14,076</td>
<td>8,496</td>
<td>-</td>
<td>43,574</td>
</tr>
<tr>
<td>Damages by insects</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Natural disasters</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Damages by forest fires (ha)</td>
<td>3,492</td>
<td>4,707</td>
<td>184</td>
<td>17</td>
<td>-</td>
<td>8,400</td>
</tr>
<tr>
<td>Other (define)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Fires are not an unknown phenomena in Albania (see Table 1.11). Most of the forest fires are of human related origin including negligence, arson etc. Albanian institutions and EFFIS provide varying figures about fires, with the EFFIS revealing higher burn areas every year than other institutions.

Table 1.11 Forest fires according to different sources (Source: EFFIS&MoE)

<table>
<thead>
<tr>
<th>Year</th>
<th>Burned area (ha)</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EFFIS</td>
<td>MM</td>
</tr>
<tr>
<td>2011</td>
<td>28,203</td>
<td>3,492</td>
</tr>
<tr>
<td>2012</td>
<td>43,795</td>
<td>4,707</td>
</tr>
<tr>
<td>2013</td>
<td>584</td>
<td>184</td>
</tr>
<tr>
<td>2014</td>
<td>165</td>
<td>17</td>
</tr>
<tr>
<td>TOTAL</td>
<td>72,747</td>
<td>8,400</td>
</tr>
</tbody>
</table>

Biodiversity conservation and management

Albania has established an extensive network of protected areas covering more than 16% of the territory and encompassing six different protected areas categories according to the IUCN (see Table 1.12). Forests cover about 47% of protected areas territory. Protected areas authorities are responsible for the management of about 20% of the forest fund of Albania. Nevertheless, these are the most preserved and the most wonderful forest areas of Albania, including some areas of truly pristine old growth forests.
Natural Resource Management in Southeast Europe: Forest, Soil and Water

B1.2.5 Institutional set up of the forest sector, legal and policy governance

Organization of the forest sector

The Ministry of Environment is the highest authority for the forestry sector in Albania. It is responsible for the development of policies and legislation related to forests and their management. The ministry also covers a technical role as regards the management and extension service related to forests. This role, however, is barely implemented since the ministry lacks local structures to fulfil the relevant and required duties.

At the local level, the management of forest areas is the responsibility of the municipalities. They should take all necessary measures to guarantee the governance and management of forest areas within their administrative boundaries. Important stakeholders are the Forest and Pastures User Associations established within every commune/municipality to help with the management of forest and pasture transfer to the local communities. These associations were established and supported by international projects (e.g. Albania Forestry project 1997-2004, Natural Resources Development Project 2007-2013).

Another important institution related to forest management is the National Agency for Protected Areas (NAPA). Established in February 2015, the NAPA is responsible for the management of protected areas and all natural resources within their boundaries. Forests within protected areas are not transferred to municipalities and are under the responsibility of the NAPA. The NAPA also has the role of extension service to provide support to municipalities in the management of the forest resources. Locally, the NAPA is organized into 12 Regional Administrations for Protected Areas (RAPA). Each RAPA is responsible for the management of the protected areas within the respective region.

In January 2016 the government approved the Document of Strategic Policies on Biodiversity Protection that will be the guide as to how Albania will fulfil its share of its commitments to the Convention on Biological Diversity. Action plans will follow, as they will present the next steps to achieving these strategic goals.

Recognizing Albania’s importance as a biodiversity hot spot, the EU through its IPA 2013 program, is funding the NaturAL project (4.4 million euros). The project is supporting the Albanian government to improve protected areas management through the implementation of management plans as an instrument to halt biodiversity loss and prepare the country for its accession to the EU as well as through the identification of Natura 2000 potential sites within the country.

Forest certification in Albania

Currently there is no certified forest area or any certified forest related business, since there are no forest certification companies operating in Albania.

### Table 1.12 Protected areas network in Albania (Source: NAPA 2015)

<table>
<thead>
<tr>
<th>IUCN category</th>
<th>Nr.</th>
<th>Total area (ha)</th>
<th>Forest area (ha)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Strict reserve</td>
<td>2</td>
<td>4,800</td>
<td>4,600</td>
<td>95.8</td>
</tr>
<tr>
<td>2 National Park</td>
<td>15</td>
<td>210,501</td>
<td>117,432</td>
<td>55.8</td>
</tr>
<tr>
<td>3 Nature monument</td>
<td>748</td>
<td>3,470</td>
<td>2,585</td>
<td>74.5</td>
</tr>
<tr>
<td>4 Managed nature reserve</td>
<td>24</td>
<td>127,180</td>
<td>42,156</td>
<td>33.1</td>
</tr>
<tr>
<td>5 Protected landscape</td>
<td>5</td>
<td>95,864</td>
<td>36,704</td>
<td>38.3</td>
</tr>
<tr>
<td>6 Resource protection area</td>
<td>4</td>
<td>18,245</td>
<td>13,502</td>
<td>74.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>798</td>
<td>460,060</td>
<td>216,979</td>
<td>47.2</td>
</tr>
</tbody>
</table>

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The State Inspectorate for Environment and Forests is the only specialized law enforcement body dealing with problems related to forest activities. The Inspectorate is organized into regional offices in each region and special task force groups respond to different situations.

**Legal framework for forest policy**

The forest-related legal framework includes a series of laws dealing with different aspects of the sector, such as:

- Law no. 8906, dated 06.06.2002 “On protected areas” (amended in 2008).
- Law no.10253, dated 11.03.2010 “On hunting”.
- Law no. 9867, dated 31.01.2008 “On regulations and procedures for international trade of endangered wild flora and fauna”.
- Law no. 5-2016 dated 04.02.2016 “On the moratorium of commercial forest activities in the Republic of Albania”.
- Law no. 61-2016 dated 02.06.2016 “On the moratorium of hunting on the Republic of Albania”.

The basic law on forests approved in 2005 has been amended several times to date. A new law on forest and pasture resources is being developed in order to reflect recent changes in the property structure and management responsibilities for forests and pastures in Albania.

Actually, the policy of the forestry sector development is defined both in the National Cross-cutting Strategy for Environment 2014-2020 and the National Cross-cutting Strategy for Agriculture and Rural Development 2014-2020. Both documents aim at the sustainable and multi-functional development of forests and pastures. However, the implementation of the strategic actions foreseen in both documents will be difficult, since neither the Ministry of Environment nor the Ministry of Agriculture have adequate structures and capacities in place.

**Implementation & approximation of EU law**

The EU Council Regulation 3528/86 of 17 November 1986, as subsequently amended in 1989, 1992, and 1997, focused on the protection of forests by setting up a scheme for monitoring the damage caused to forests by atmospheric pollution. These aspects have been included in the Forest Law of Albania and the monitoring is carried out by the Agency of Environment and Forests. A number of observation plots have been established throughout the country. However, the number and frequency of monitoring, and the equipment available are inadequate; but more importantly, there is insufficient funding for the prevention and the elimination of damage caused to forests.

The Forest Law (No. 9385, 2005, amended) has partially transposed Regulation EC/2173/2005 Forest Law Enforcement, Governance and Trade (FLEGT) and Regulation 995/2010 of the European Parliament and of the Council of 20 October 2010, the so called ‘Due diligence Regulation’, which sets obligations for the operators who trade timber and timber products in the market. Because of widespread corruption, even among law enforcement agencies, the impact in practice of such legal measures has been minimal in Albania.

The amendments made to the Forest Law in 2007 added an entire chapter, making the establishment of a monitoring system and data on forests compulsory, with direct reference to the EU directives and the system used by the Food and Agriculture Organization (FAO). With regards to the role of forests in carbon sequestration, the amendments make specific reference to the Kyoto Protocol, where the Ministry of Environment, Forests and Water Administration (MEFWA) is assigned as the responsible authority for its observation, the calculation, and trading of the carbon quotas.

Furthermore, another law which has been prepared by the MEFWA, called “On the Genetic Material in Forestry”, transposes Council Directive 1999/105/EC of 22 December 1999, on the marketing of forest reproductive material. Additionally, the Law on the Protection of Wild Fauna, the Law on Hunting and the Law on Regulations and Procedures for the International Trade of Endangered Wild Flora and Fauna have transposed several dispositions of the Birds and Habitat Directives (Natura 2000).

Albania is also a party to the Ministerial Conference on the Protection of Forests in Europe (FORESTEUROPE), which includes the EU members and all other European countries, including Russia.

**B1.2.6 Forest knowledge base**

*State of forest inventories*

The latest Albanian National Forest Inventory (ANFI) was carried out in 2003 (see Table 1.13). The ANFI, implemented through a two-phase stratified sampling procedure on the basis of satellite interpretation and field measurement, showed a forest situation quite different from the situation reported from the previous inventories or official forest register (cadastre). The new forest inventory is under way, supported by the Environmental Services Project (ESP). A Swedish consortium has been selected to help Albanian institutions in defining the proper methodology and in implementing the forest inventory. Results will hopefully be available by 2018.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Area (Ha) according to the ANFI conducted in</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Forests, Shrubs, and Open Forests or Shrubs</td>
<td>1,356,329</td>
</tr>
<tr>
<td>A</td>
<td>High Forests</td>
<td>242,959</td>
</tr>
<tr>
<td>B</td>
<td>Coppice Forests with Mother Trees</td>
<td>154,589</td>
</tr>
<tr>
<td>C</td>
<td>Coppice Forests</td>
<td>584,688</td>
</tr>
<tr>
<td>D</td>
<td>Shrubs</td>
<td>374,093</td>
</tr>
<tr>
<td>E</td>
<td>Land with Forest vegetation/Open Forests or Shrubs</td>
<td>0</td>
</tr>
</tbody>
</table>

*Educational system & forests*

The Faculty of Forestry Sciences of the Agricultural University of Tirana is the only higher education institution offering study programs related to forestry. It offers a bachelor’s degree in forest management and in wood processing. The faculty also offers master’s level courses. The improvement of the curricula, in line with best EU models and standards, is not followed by an increased level of teaching and improved laboratory infrastructures and tools. The average number of students who graduate from the faculty each year for the period 2008-2015 is 30 for the bachelor’s degree and 27 for the master’s degree.

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1 The ANFI data showed that in comparison with the National Forest Inventory of 1985 the forest area (Forests, Shrubs and Open Forests or Shrubs) is apparently increased because of the inclusion of Open Forests or Shrubs area, in the meanwhile the forest and shrub area with a vegetation cover over 30% is decreased with about 100,000 ha.
Another important institution related to the educational system for forestry is the Forest Technical School in Shkodra. This school provides a four-year vocational training school for forests technicians. Recently the school is shifting its profile towards agricultural training as this is most required in the region. The average number of students graduated each year is 20.

B1.3 Assessment of the water management
B1.3.1 Water resources and policy in Albania

Physical Framework - Climate in the territory of Albania

The climate in Albania is typically Mediterranean, characterized by mild winters with abundant rainfall and hot and dry summers. The mountainous relief leads to a variable climate, passing from very cold winters in the northern, northeast and southeast parts of the country to very hot and dry summers in the west coastal zone. The mean annual temperatures varies from 16-17°C in the west coastal area to around 7°C in the north mountain zone. Maximal annual temperatures vary from 11.3°C in the mountain zone up to 21.8°C in the low and coastal areas, and the minimal values vary from -0.1 to 14.6°C respectively. The minimal absolute temperature is -25.8°C and the highest is 43.9°C.

The total annual precipitation over the territory is about 1,485 mm/year. However, their spatial distribution varies across a broad range. The southeastern part of the country is characterized by less precipitation, with an annual value of 600 mm, followed by Myzeqe fields in which the fall is up to 1,000 mm/year. The maximal precipitation is registered in the Albanian Alps is 2,800 – 3,000 mm/year). The southwestern mountain region is another abundant area in regards to precipitation, with rainfall levels reaching 2,200 mm/year. The month with a highest precipitation is November; and the months with the least precipitation are July and August. There are between 80 -120 days where the precipitation is >1.0 mm across the entire territory.

The hydrographic basin of Albania has a total area of 43,305 km² from which only 28,748 km² are situated within the state territory of Albania.

Due to the high variability of climatic and land characteristics, the spatial distribution of the water resources in Albanian territory is heterogeneous. The long-term average specific yield has a spatial variability of between 10 to 100 l/s/km² in the Albanian territory. The mean discharge of the 8 main rivers is 1,308 m³/s, which corresponds to a module of 30 m³/s.km². (Figure 1.6 in Annex)

Flooding is a frequent problem in Albania as pluvial (rainwater) floods occur regularly. During these floods, the values of the maximum flow module for the main rivers varied from 0.5 m³/s/km² (River Drin) to 2 - 5 m³/s.km² (River Ishem), while in rivers with a smaller basin (A = 100 - 400 km²) this fluctuation is from between 2 to 10 m³/s.km².

Surface water is widely used in irrigation, electricity generation, some industrial processes, mining, construction, etc. Irrigation processes use the water from rivers and 626 reservoirs with a total estimated volume of 562 million/m³ calculated to irrigate 154,000 hectares, constituting 22% of agricultural land. After 1990, water monitoring was reduced; therefore, the quality of data is scarce. It is obvious there has been an increase in surface water pollution due to the growth of urban effluents put into the river watershed.

Water policy - Coordination mechanisms across water related sectors

Albania has formally set in place a coordination mechanism for water management across water related sectors. A coordination strategy has been created at the highest political level in order to integrate the national sector water policies and sectoral views and interests in the development and implementation of the IWRM framework (GWP, 2004b). Four pillars have been defined:

1. **Water for People**, which includes drinking water and sanitation;
2. **Water for Food**, which includes agriculture;
3. **Water for Industry**, which includes hydropower, hydrothermal sources, light and heavy industrial activities, solid waste management, fishing and aquaculture, shipping and recreation;

4. **Water for Environment**, which includes protected areas, wetlands and forests.

Integrated Water Resources Management principles, which are based on economic efficiency, environmental sustainability, and social equity (GWP, 2011) will be applied. Social equity is defined as being: “to ensure equitable access to water, and to the benefits from water use, between women and men, rich people and poor, across different social and economic groups both within and across countries, which involves issues of entitlement, access and control” (Lenton and Muller, 2011).

**B1.3.2 River basin Management**

For water management purposes, the eight watersheds of Albanian’s large rivers have been, since 1998, combined, into six main hydrographical units called “River Basins” (see Figure 1.6 in Annex) in accordance to EU legislation (WFD, Article 3). Each river basin has a **River Basin Council**, chaired by the prefect (6 RBCs). River Basin Agencies (RBAs) are the cornerstone in integrated water resources management. The River Basin Councils (RBC’s) have legal status and depend on the Technical Secretariat of the National Water Council (NWC). The rights and duties of the RBC’s are determined by the NWC.

RBC’s are supported by the **River Basin Agencies** (RBA), which function as a technical secretariat to the RBC. They are responsible for the implementation of the Law on Water Resources, for implementing decisions by the RBC and in general for managing the water resources within its basin areas. They make technical evaluation of applications for water abstraction and recommendations to the RDC for approval. They support municipalities by solving problems related to water resources and are responsible for the on-site inspection of all activities related to water resources use. However, the RBAs have little authority to enforce legal and regulatory procedures.

**Water Resources**

Water resources in Albania encompass surface and ground water. Both these resources are abundant. Surface water includes eight rivers, three natural lakes (Ohrid, Prespa and Shkodra) and a multitude of minor lakes and reservoirs. Some lagoons are situated along the sea coast, the main ones being the Karavasta, Narta and Butrint lagoons.

Although resources are spread throughout the country, they are unevenly distributed over the country’s territory. Nevertheless, Albania is considered to be a water-abundant country and renewable water resources amount to approximately 39.22 billion m$^3$/year, out of which 65% originate in Albania with a total of 30% from groundwater. In Table 1.14 and Table 1.15 the water withdrawal and the water resources use are presented.

<table>
<thead>
<tr>
<th>Table 1.14 Water withdrawal (Source: FAO 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal water withdrawal per capita</td>
</tr>
<tr>
<td>Agricultural water withdrawal</td>
</tr>
<tr>
<td>Industrial water withdrawal</td>
</tr>
<tr>
<td>Total water withdrawal per capita</td>
</tr>
</tbody>
</table>
Table 1.15 The use of water resources (Source: Ministry of Agriculture (A. Muka) 2015)

<table>
<thead>
<tr>
<th>Water use</th>
<th>Used volume ((10^9)m^3)</th>
<th>Consumption volume ((10^9)m^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>13.97</td>
<td></td>
</tr>
<tr>
<td>Irrigation:</td>
<td>1.01</td>
<td>0.5</td>
</tr>
<tr>
<td>From reservoirs</td>
<td>0.56</td>
<td>0.28</td>
</tr>
<tr>
<td>From rivers &amp; lakes</td>
<td>0.45</td>
<td>0.22</td>
</tr>
<tr>
<td>From ground waters</td>
<td>0.003</td>
<td>0.002</td>
</tr>
<tr>
<td>Public use</td>
<td>0.2</td>
<td>0.18</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15.8</strong></td>
<td><strong>0.68</strong></td>
</tr>
</tbody>
</table>

**River basins and topography**

Albania is crossed by eight major rivers, in a general East-West direction. The Rivers Drini, Mati, Ishmi, Erzeni, Shkumbini, Semani, Vjosa, and Bistrica are the most important ones.

The River Drin basin is the largest Albanian River Basin. The River Drin has a mean annual discharge of 680 m³/s, of which 360 m³/s come from the Drini itself and 320 m³/s from the Buna. The resulting specific discharge is about 35 l/s.km². Most drinking water in the Drini basin is drawn from springs, and 73% of the population has piped water supply systems in or outside their homes. The River Mati basin has a catchment area of 2,441 km². The River Mati has a mean annual discharge of 103 m³/s. The resulting specific discharge is about 40 l/s.km². The Erzeni-Ishmi basin unit is composed of the catchments of the Erzeni and the Ishmi, with a global surface of 1,439 km². The Ishmi basin has a particular importance for Albania because it includes the biggest urban centre, Tirana. The Shkumbini basin has an area of 2,445 km² and contains the River Shkumbini, some minor tributaries and small irrigation reservoirs used for agricultural purposes. The River Semani basin has a hydrographical catchment area of 5,649 km². The River Vjosa Basin is the second largest river system in country. The Vjosa basin includes the Vjosa catchment itself, the catchments of rivers in the South of Albania (Bistrica, Pavlla) and also the region along the Adriatic and Ionian seas known as the Albanian Riviera. The total area is about 8,100 km². The Albanian catchment of the River Vjosa has an area of 4,365 km². The annual discharge volume is 5,550 million/m³ and the specific discharge 26 l/s.km².

**River basin management plan and implementation**

In September 2011, the Council of Ministers approved “The National Water and Sanitation Strategy (NSWSS) for 2011-2017” (GoA, 2011) which defines the main objective for such an approach by “establishing management, monitoring and assurance of effective functioning of an integrated system for water supply which enables flexibility in different situations”.

The NSWSS defines the following priorities: (i) expand and improve the quality of water supply and wastewater services; (ii) orient water utilities toward principles of cost control and cost recovery; (iii) improve governance and regulation in the sector; (iv) invest in enhancing the capacity of the sector, and; (v) move toward full convergence of Albanian laws and regulations with EU Water Directives.

The National Waste Management Plan (GoA, 2011b) stipulates the closure of open dumpsites with uncontrolled and untreated leachate emissions, and their replacement with 12 regional, controlled landfills by 2025. The authorities assume that fewer landfills would be needed due to the introduction of recycling and recovery activities, which are the cornerstone (circular economy) principles of waste management in the EU, with landfilling as the least desirable option. By enabling the implementation of national waste management policies, risks for groundwater pollution decrease tremendously and as such these policies are important for applying the IWRM principles.

Both the National Strategy on Biodiversity and the National Cross-cutting Environment Strategy (2015-
2020) (GoA, 2015c), that includes policies in the field of forestry of chemicals and climate change are strongly related to the Integrated Water Resources Management Strategy. They provide a framework for protecting the valuable natural resources of Albania. This is important for sustainable water use by all other sectors. The 'Integrated Water Resources Management Strategy, 2015-2018' is in consolidated draft version, August 2016 as well as “Electronic National Water Resources Cadastre”.

B1.3.3 Flood management

Flooding from the torrents

Flooding is caused by rivers and torrential floods and they frequently occur in the valleys of northern, central and southern Albania, affecting cities, road networks and inundating agricultural land. According to data from the Ministry of Agriculture (A. Muka 2015) there is a total of 860 km of flood protection embankments in Albania. Every year, efforts are made to repair and reconstruct some of these embankments (see Table 15). The measures undertaken have decreased the risk of inundations from these floods. Nevertheless, during periods of intensive rainfall, and particularly because of the lack of maintenance of urban drainage, these floods still present a certain risk of inundation.

<table>
<thead>
<tr>
<th>Total length of embankments reconstructed (Km)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>39</td>
<td>17</td>
<td>5</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>

History of floods and consequences

Flooding is a natural phenomenon in Albania. They are caused by torrential rains, characteristic of the Mediterranean climate. The mountainous character of the rivers, hence the large slopes and the same direction of the flow from east to west, make that peak discharge occur almost simultaneously across the country. In most rivers we have flash floods crossing the river network over an 8 - 10 hour period.

During big floods, which have a return period of 50 to 100 years, the waters inundate the embankments, flooding mainly the Western Plains.

The Western Plains and the Drini and Vjosa river basins are particularly prone to flooding due to deforestation and the lack of riverbed management (World Bank, 2003). Flooding has a direct influence on the life of local communities, by damaging their houses and weakening their economic position. By causing significant damage to agricultural lands and disrupting drinking water supply services, floods increase human health risks and can seriously damage various infrastructures. Most floods take place along the Buna, Drini, Vjosa, and Semani river basins, potentially affecting 24,000 buildings and up to 840,000 people. According to internal reports from the MARDWA, the flooding from the River Vjosa in January 2016 was the worst since 1954. Floods in other river basins potentially affect 8,000 buildings and up to 50,000 people (UNDP, 2011a). Major floods that have occurred in recent years are presented in the Table 1.16.
Table 1.17 Major flood events in the 2000 - 2015 period (Source: M. Ndini, Source: Study for European Commission, 2015 - Flood Prevention and Management)

<table>
<thead>
<tr>
<th>Major flood events in the 2000 - 2015 period</th>
<th>Affected areas, municipalities</th>
<th>Extent of damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan’. 2010</td>
<td>Shkodra, Lezhë and Durrës</td>
<td>10,000 hectares flooded, over 5,000 people evacuated, 2,200 houses damaged</td>
</tr>
<tr>
<td>Nov’ - Dec.’ 2010</td>
<td>Drini and Mati River Deltas, Ulza and Shkopeti reservoirs</td>
<td>15,000 people evacuated, 6,000 km² land flooded, 4,800 houses flooded</td>
</tr>
<tr>
<td>Nov’. 2014</td>
<td>Tirana, Lezhë, Shkodër and Fier</td>
<td>11,000 people evacuated, 3 people died, 7,500 houses damaged</td>
</tr>
<tr>
<td>Feb’. 2015</td>
<td>Vlora and Fier, Berat, Elbasan and Gjirokaster Rivers, Vjosa, Devoll, Osum, Seman</td>
<td>42,000 people affected</td>
</tr>
</tbody>
</table>

Flood risk management plan

A preliminary flood risk assessment is not developed in Albania, however there are some ongoing activities and projects that are relevant for preliminary risk assessment. Specifically, data on floods and their associated losses are systematically collected by the General Directorate of Civil Emergency / Ministry of Internal Affairs by using the methodology and tools DesInventar (see www.desinventar.net). Furthermore, the flood prone areas have been mapped for the lower part of the Rivers Buna and Drini. A Post-Disaster Comprehensive Flood Risk Assessment & Management Study, a Risk Analysis of Flood Hazard & Impact (March 2012) supported by the General Directorate of Civil Emergency / Ministry of Internal Affairs, and implemented by Mott MacDonald (https://www.mottmac.com/) has been developed. These actions represent a starting point for conducting a PRA at national level.

Though the development of a Flood Risk Management Plan (FRMP) is included into Law 11/2012, only few pilot attempts are currently present in Albania and there is not a systematic elaboration of a FRMP for each Unit of Management. A FRMP has been developed for the lower part of the Rivers Buna and Drini in the framework of a project (Author, 2015) implemented by the German Agency for International Cooperation GIZ GmbH in collaboration with key national institutions such as the Ministry of Environment, Ministry of Agriculture, Rural Development and Water Administration, Ministry of Internal Affairs – General Directorate of Civil Emergencies, and the local government of the Shkodër Region.

Flood Hazard and Flood Risk Mapping

The state of flood hazard and risk mapping is at an early stage in Albania and no substantial activities are present in the country. Flood Hazard and Risk Mapping have been produced on a project base for the lower part of the Rivers Drini and Buna by three different initiatives: 1) IncREO project “Increasing Resilience through Earth Observation” (http://www.increo-fp7.eu/project-overview/project-structure/flooding-use-case-albania/), supported by EU-FP7; 2) “Climate Change Adaptation in Western Balkans” programme, implemented by Germany Agency for International Cooperation (GIZ - https://www.giz.de/en/worldwide/294.html); 3) “Drini and Buna risk assessment - A Post-Disaster Comprehensive Flood Risk Assessment & Management Study, Risk Analysis of Flood Hazard & Impact”, March 2012, implemented by the General Directorate of Civil Emergency – Ministry of Internal Affairs with the financial support of the World Bank.

B1.3.4 Water quality

Classification of the ecological state of water bodies

In terms of water quality, the organic and nutrient compounds for all lakes were at satisfactory levels in the period 2004-2015. Currently, the water quality status is not clear since many physical-chemical parameters are not monitored regularly. Water quality assessments undertaken in 2016 using classification
systems based on biological, hydro-morphological, chemical and physical-chemical parameters (EU-WFD characterization), show pollutant and hydro-morphological impacts on aquatic ecosystems (GIZ, 2016).

Table 1.18 Water quality parameters measured in water basins (Source: Environmental Assessment of Water Quality of Albanian Rivers. A. Çullaj, A. Miho, P. Lazo, 2016)

<table>
<thead>
<tr>
<th>Water quality parameters measured in water basins</th>
<th>Station</th>
<th>Evaluation based on the Physicochemical parameters</th>
<th>Heavy metals concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Av. class</td>
<td>Evaluation</td>
</tr>
<tr>
<td>Mati</td>
<td>Ma 1</td>
<td>2.0</td>
<td>Good</td>
</tr>
<tr>
<td></td>
<td>Ma 2</td>
<td>2.2</td>
<td>Good-Fair</td>
</tr>
<tr>
<td></td>
<td>Ma 3</td>
<td>2.3</td>
<td>Good-Fair</td>
</tr>
<tr>
<td>Ishmi</td>
<td>Ish 1</td>
<td>2.7</td>
<td>Good-Fair</td>
</tr>
<tr>
<td></td>
<td>Ish 2</td>
<td>4.5</td>
<td>Bad-Very bad</td>
</tr>
<tr>
<td></td>
<td>Ish 3</td>
<td>4.2</td>
<td>Bad-Very bad</td>
</tr>
<tr>
<td>Shkumbini</td>
<td>Sh 1</td>
<td>2.7</td>
<td>Good-Fair</td>
</tr>
<tr>
<td></td>
<td>Sh 2</td>
<td>2.8</td>
<td>Good-Fair</td>
</tr>
<tr>
<td></td>
<td>Sh 3</td>
<td>2.7</td>
<td>Good-Fair</td>
</tr>
<tr>
<td>Semani</td>
<td>Se 1</td>
<td>2.2</td>
<td>Good-Fair</td>
</tr>
<tr>
<td></td>
<td>Se 2</td>
<td>2.5</td>
<td>Bad-Very bad</td>
</tr>
<tr>
<td></td>
<td>Se 3</td>
<td>4.3</td>
<td>Fair</td>
</tr>
</tbody>
</table>

Other reported water quality data (NEA, 2015) on surface waters show a high content of nutrients (nitrogen and phosphorous) and total suspended solids, leading to siltation of the river deltas and coastal lagoons. On the other hand, reports show that the quantity of heavy metals in water, sediments or in biota is relatively low, a probable consequence of a decreasing impact of the remaining mining industry. Nevertheless, transitional and coastal waters in Albania are negatively impacted by both domestic and industrial wastewaters (Miho et al., 2013).

A map of the monitoring network

In the main rivers in Albania water quality monitoring is undertaken by the National Environmental Agency in 34 stations in all the river courses, 4 times per year. The lake monitoring is done in 6 stations and one in Butrinti Lagoon (3 times per year). The maritime water monitoring affected by the urban waters is done in 10 stations in the cities of Durres, Vlora and Saranda. According to the EU Water Framework Directive, the assessment of river waters is based on eight main parameters of chemical pollution. River waters are classified into five categories where the moderate status (the third class) is considered as a minimal level accepted for the river water quality.

The ground water monitoring is undertaken in 41 stations twice a year.

Surface water (ecological and chemical status)

In the monitoring program the following parameters are observed: temperature, pH, alkaline, salinity, electrical conductivity, dissolved oxygen, NKO, NBO₃ nitrite, ammoniac, Pₜₜₜ PO₄, suspended material. The river waters are evaluated as alkaline with pH levels from 7.5 - 8.3 and with values between the permitted values (< 8.5).

Dissolved oxygen is greater than 7 for almost all the rivers except the River Gjanica one where this value is 4.7 mg/l classified in the IV class, as a poor status. This is because of the direct impact of urban discharges
The O2 index for all rivers is classified on the III class. The trend results have been stable from 2010 - 2015 (National Agency of Environment. 2015)

The index for BNO₃ in all rivers is classified in the V class as a bad one. The values are growing each year with the main cause being urban and industrial water discharges.

The indexes for the Ptotal in all the basins of the rivers show that the waters are poor as classified in the IV class. The Nitrite NO₂ is classified in the III class as accepted one and have a stable trend.

In general, Table 1.19 shows the classification of the waters in Albanian rivers. There are 41% of all monitoring stations that have very good quality, 35% of the III quality or moderate status and 24% of the IV-V class or poor and bad status.

<table>
<thead>
<tr>
<th>Classification</th>
<th>I Quality</th>
<th>II Quality</th>
<th>III Quality</th>
<th>IV Quality</th>
<th>V Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stations</td>
<td>2 stations</td>
<td>12 stations</td>
<td>12 stations</td>
<td>1 station</td>
<td>7 stations</td>
</tr>
<tr>
<td></td>
<td>5.9%</td>
<td>35.3%</td>
<td>35.3%</td>
<td>2.9%</td>
<td>20.6%</td>
</tr>
</tbody>
</table>

**Groundwater (GW) (chemical and quantitative status)**

In general, the GW have good physical-chemical properties. The monitoring of the chemical composition of GW in some of the wells, shows that there is a higher composition of that recommended for some indicators as Cl, Mg, Na and SO₄.

Some areas are classified with high salinity and with a composition of the Na, Cl and SO₄ that is above the norms. These layers are deep and are not used as drinking waters. There is no massive pollution. In all the aquifers the pH is within the permitted values of 6.5 - 8.5. The GW is alkaline and neutral. The values of the pollution indices of the GW with ammonia, nitrite, and nitrate are not increasing. It is recommended to implement sanitary zones and ban gravel extraction on the river beds.

**Waste water treatment and reuse**

Currently, approximately 50% of the Albanian population is connected to sewage systems, especially in urban areas; but only 25% are served by fully operational wastewater treatment plants. As such, direct wastewater discharge into water bodies has led to extensive and severe contamination of coastal areas, rivers and riverbeds (World Bank, 2003).

Currently, Albania in a conventional mechanical approach has four wastewater treatment plants, located in Kavaja, Pogradec, Vlora and Korca, and three represent a combination of mechanical plant/wetland wastewater treatment located in Durres, Saranda and Lezha. Through an ongoing project on “Integrated management and cleaning of the coastal areas” a wastewater treatment plant will be constructed in Himare and in Orikum founded by Islamic Development Bank (IDB).

Challenges to reach an effective wastewater system include (World Bank, 2003): The limited number of operational, conventional wastewater treatment plants (Kavaja, Pogradec, Durres, Sarande and Lehze) that do not serve most of the population and their efficiency has limited impact upon environmental protection.

**B1.3.5 Water demand**

**Water supply**

In Albania, the drinking water supply comes mainly from natural sources and underground water resources. By the end of 2015, approximately 80% of the total population was connected to a water supply system.
Natural Resource Management in Southeast Europe: Forest, Soil and Water

with 50% connected to wastewater systems especially in urban areas but only 25% is served by fully operational wastewater treatment plants. Most drinking water (75%) is obtained from groundwater sources. 80% of the total population is served by piped water supply systems, 76% of which are direct house connections. According to official data (MoTI, 2015), 91% of the urban population was connected to municipal water systems and only 57% in rural areas. The coverage targets for 2017 for urban and rural areas are 98% and 85% respectively (NSWSS, 2011). Despite the relatively high coverage, the level of service can be improved as the average drinking water availability was only 50% (WRA, 2016) and, although currently progressing, this is well below the EU benchmark.

The status of groundwater wells, pumping stations, distribution systems and cisterns is not monitored systematically. Inadequate maintenance and repair, lack of metering and operational control have together resulted in excessive water losses, which are estimated to be larger than 60% of the total water production for all cities.

The national standard for urban supply is 150 l/capita/day, while in rural areas this standard is 80 l/capita/day. A summary of the water supply and sewerage sector performance for 2012 - 2015 is presented in Table 1.20.

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Performance trend</th>
<th>Good performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water supply coverage (%)</td>
<td>80.51</td>
<td>80.06</td>
<td>80.47</td>
<td>81.43</td>
<td>No change</td>
<td>n/a</td>
</tr>
<tr>
<td>Sewerage coverage (%)</td>
<td>49.37</td>
<td>48.29</td>
<td>48.22</td>
<td>50.09</td>
<td>No change</td>
<td>75</td>
</tr>
<tr>
<td>Water supply (hours/day)</td>
<td>11.69</td>
<td>11.99</td>
<td>12</td>
<td>12</td>
<td>No change</td>
<td>18</td>
</tr>
<tr>
<td>Collection ratio (%)</td>
<td>90.9</td>
<td>82.23</td>
<td>91.15</td>
<td>91.93</td>
<td>Upwards</td>
<td>95</td>
</tr>
<tr>
<td>Metering ratio (%)</td>
<td>55.05</td>
<td>58.97</td>
<td>61.13</td>
<td>63.52</td>
<td>Upwards</td>
<td>85</td>
</tr>
<tr>
<td>Non-Revenue Water (%)</td>
<td>66.98</td>
<td>67.07</td>
<td>67.3</td>
<td>66.7</td>
<td>No change</td>
<td>45</td>
</tr>
</tbody>
</table>

Source: WRA, 2016

Water scarcity and droughts

The average annual capacity of water supply sources in Albania for 2010 was estimated to be around 654 million cubic meters per year, while the total demand for water, estimated at a rate of 150 litters per capita per day (rate request Albania applied) and an allowance of 20% for technical water losses, is estimated to be 197 million cubic meters per year for the population served, and 240 million cubic meters year for the total population in the service area. This shows that the total resources are nearly 3 times the expected demand for the entire population, served and unserved in areas under the administration of enterprises. This does not mean that all areas have an ample supply. Some specific areas need investment in water production to meet domestic demand. These figures show that the issue in Albania is not producing more water, but managing the demand for water produced.

Irrigation

In fact, irrigation is the country’s largest consumptive water user. An estimated 360,000 ha have been equipped for irrigation, 280,000 ha for drainage and 130,000 ha for marine flood protection (2012 estimates); but in 2009 only approximately 20 percent of the equipped area was irrigated. About 626 agricultural dams provide water for irrigation purposes, mainly during the hot and dry summer season. Water from irrigation
reservoirs (with a design capacity of about 560 million m³) is used for irrigation, while approximately 450 million m³ of water is directly diverted from the rivers and streams. The use of groundwater for irrigation is limited (only 3% of total (Ismaili, 2010)), also because irrigation water is generally of satisfactory quality.

Due to erosion and alluvium, the real water retention capacity of the reservoirs is approximately 51% of the designed capacity. Furthermore, 410 of the 626 dams have significant technical damage that needs urgent attention to ensure dam safety and availability of water for irrigation. The average reduction in design capacity is 45% as a result of the functional life cycle of the dams and reservoirs nearing their end and reservoirs filling up with silt.

Preliminary findings detailed by the MARDWA (2015) indicate that approximately 200,000 ha of irrigated area require irrigation infrastructure rehabilitation. Canals also require silt removal and 5,000 km of lining. Furthermore, approximately 3,000 irrigation structures require modernization or replacement. Moreover, almost all of the 640 pumping stations for irrigation are out of order due to high electricity costs, poor maintenance, damage and theft.

B1.3.6 Institutional composition of the water sector, legal and policy governance

Organization of the water sector:

The main bodies responsible for water management are:

The National Water Council (NWC). This is the central executive body for water resources management. The Prime Minister chairs the NWC and it is supported by the Technical Secretariat of National Water Council (TSNWC).

In February 2015, the responsibility of the “Water Policy Directorate” was transferred from the Ministry of Environment, Forests and Water Administration (MEFWA) to the Ministry of Agriculture, Rural Development and Water Administration (MARDWA) responsible for managing irrigation, drainage and flood protection.

National institutes involved in water monitoring and assessment

The organisation of water (resources) monitoring in Albania is complex, with over 20 different government institutions currently involved in data collection for a limited number of parameters with partial geographical coverage.

Overall, the National Environmental Agency (NEA), under the Ministry of Environment, is responsible for quality and quantity monitoring of water resources. It supervises the work of relevant institutes on monitoring activities and is the main beneficiary of data provided by the following institutions:

- The Institute of GeoScience, Energy, Water and Environment, (formerly the Hydro-meteorological Institute) under the auspices of the Ministry of Education, monitors hydro-meteorological parameters and is responsible for carrying out surface water quantity monitoring for rivers and lakes.
- The Albanian Geological Services (AGS), under the auspices of the Ministry of Energy and Industry is responsible for quality monitoring of underground and marine waters, risk assessment and soil pollution monitoring.
- The National Agency of Natural Resources, under the auspices of the Ministry of Energy and Industry, has a focus on planning and monitoring of hydropower plants.
- Institute for Public Health, through their regional agencies, monitors hygiene and drinking water quality.
- The Water Regulatory Authority is an independent institution with its main duties being the issuance of licenses for drinking water supply, approving drinking water tariffs and monitoring activities for water supply.

Legal framework

As Albania moves towards EU membership, the legal and institutional framework and the knowledge base
for addressing policy preparation, planning, implementation and evaluation are under constant review. The current Albanian legislation and regulations on water management includes primary legislation, by-laws, and inter-sectorial legislation while also implementing EU legislation.

Albania’s waters have been regulated since 1992 with the Law on Water Resources: Nr. 8093, dated 21.3.1996.

The new Law No. 111/2012 “On Integrated Water Management” authorizes the following:
- Protection and improvement of the aquatic environment, surface waters, either temporary or permanent, sea water, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater, and their status.
- Security, protection, development and sustainable use of water resources, necessary for life and for the social and economic development of the country.
- Equitable distribution of water resources, as intended by their effective management.
- Protection of water resources from pollution, over use and promotion of consumption contingent on actual needs.

**Implementation & approximation of EU law**


The 2014 ECRAN Monitoring Report states that the transposition level of the WFD is 65%.

The transposition of the Floods Directive (FD) has advanced due to the drafting of the Decision of the Council of Ministers (DCM) on the content approved by the National Water Council. This DCM transposes, among other EC Directives, the Directive 2007/60/EC for the assessment and management of risks from flooding. The 2014 ECRAN Monitoring Report states that the transposition level of FD is 73%.

**B1.4 Assessment of soil management**

**B1.4.1 Status of the soil data**

The Albanian soil science landscape is very diverse and complex. The first national soil map at a scale of 1:200,000 was compiled in 1958 (Veshi and Spaho, 1988). This was followed by intensive soil surveys, especially during the period 1971 - 1991, when detailed soil maps from 1:10,000 to 1:50,000 scale, along with soil reports, were prepared for each former agricultural co-operative, state farm and district. In addition to arable land, soil surveys covered also natural pastures and forests, though the intensity of soil sampling was less detailed than that of arable land.

The national soil classification system and methods of soil resource inventory in Albania were developed locally with minimal input from the outside world. The system itself was a surrogate of the Russian system of soil classification. Due to the size of the country and particularly, the extent of arable land, the Albanian system served its purpose. Based upon data accumulated during the period 1970 - 1988, the Soil Science Institute in Tirana developed a Physical Land Evaluation study for all the agricultural lands of the country. The study, among other things, highlighted some important soil constraints such as salinity (about 10,000 ha), alkalinity in the western costal area (about 60,000 ha) and acidity in (about 70,000 ha), mostly in the northeastern part of the country (Kaleshi et al 1992).

Modern soil science concepts were not used and the translation to other systems, such as the FAO Legend (FAO-UNESCO, 1974), World Reference Base for Soil Resources – WRB – (FAO, ISRIC and ISSS. 1998), and USDA Soil Taxonomy (Soil Survey Staff, 1998) proved difficult.
Table 1.21 Classification of the soils of Albania according to USDA Soil Taxonomy (Source Zdruli (1997a))

<table>
<thead>
<tr>
<th>Soil taxonomy order</th>
<th>Area (ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosols</td>
<td>3,978</td>
<td>0.5</td>
</tr>
<tr>
<td>Vertisols</td>
<td>58,542</td>
<td>2.0</td>
</tr>
<tr>
<td>Mollisols</td>
<td>208,402</td>
<td>7.0</td>
</tr>
<tr>
<td>Alfisols</td>
<td>498,670</td>
<td>17.0</td>
</tr>
<tr>
<td>Inceptisols</td>
<td>1,015,951</td>
<td>35.0</td>
</tr>
<tr>
<td>Entisols</td>
<td>164,613</td>
<td>6.0</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>924,640</td>
<td>32.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,874,796</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The first attempt to convert the national system of soil classification into other well-known systems was undertaken between 1994 and 1997. Zdruli (1997a) provides the following soil orders of Soil Taxonomy for Albania (Table 20). According to this classification the majority of soils in Albania are classified under Inceptisols (35%) and Miscellaneous (32%). This was followed in 2001 by a more detailed soil survey, under the INTERREG II Programme sponsored by the European Commission and the Italian Government, aiming at the creation of a national soil database at a scale of 1:250,000 and another much more detailed soil database for the coastal areas of the country at a scale of 1:50,000 (Zdruli et al., 2003).

B1.4.2 Monitoring of soil

**Status of soil**

There are no up-to-date data about the status of soil in Albania. The Institute of Soil Science, the unique institution responsible for assessing and monitoring soil status in Albania, has been diluted within the Agriculture Technology Transfer Center of the Ministry of Agriculture and lost its capacities. No data exist at the national level about soil characteristics including depth, structure, texture, humidity, depth of the humus layer, etc. The National Environment Agency is conducting some monitoring on soil erosion and soil contamination at specific hot spots. These are previous sites of heavily polluting industrial activities such as oil processing, fertilizer production, metal industry, etc. The monitoring has shown that the contamination by heavy metals is an enormous problem on these sites.

**Indicators for assessing the risk of land degradation**

Soil erosion, deforestation, overgrazing, soil pollution, re-salinization, acidification, water logging, flooding, urbanization and soil sealing, nutrient mining and loss of soil fertility are the most alarming problems in Albania.

Land degradation in Albania is a self-accelerating phenomenon. One form of degradation creates the conditions for a further soil and water resources degradation. The degradation of soil conditions is more serious than the degradation of vegetative cover in the sense that it is not easily reversible. The following types of indicator show that degradation is evident or even worsening:

- Loss of topsoil through water erosion is the most common type of human-induced soil degradation. Because the topsoil is normally rich in nutrients, a relatively large amount of nutrients is lost together with the topsoil.
- Loss of topsoil itself is often preceded by compaction which causes a decrease in infiltration capacity of the soil and leads to accelerated run-off and soil erosion. Compaction is typically caused by livestock if overgrazing happens. Loss of topsoil is also caused by loss of vegetative cover, which is caused by deforestation (overharvesting, fires, and unplanned land use changes).
- Terrain deformation/mass movement through water erosion is apparent and easily observed. The most common phenomena of this degradation type are gully formation. Other phenomena of
this degradation type are riverbank destruction and mass movement (landslides), and off-site deposition of the eroded material in a negative way (choking of river beds and siltation of dams).

- Loss of nutrients occurs where agriculture is practiced on poor or moderately fertile soils, especially on steep slopes, without sufficient application of manure or organic fertilizers. It causes a general depletion of the soil fertility and leads to decreased productivity.

B1.4.3 Soil degradation

Erosion

Soil erosion has been identified as a major issue for Albania. Currently, highly degraded lands are subject to continuous erosion. At a national scale, every year 8 - 24 ton/ha of soil is eroded and discharged to the sea or filling up reservoirs (including hydropower plants’ reservoirs) highly reducing their capacity. Soil erosion affects people’s livelihoods dramatically. The productivity of agricultural land is reduced thus leading to reduced crops and reduced income. In addition, it leads to increased costs due to the application of artificial fertilizers. Due to erosion the carrying capacity of pasture areas is reduced which means reduction in the number of livestock and reduced income or it can lead to ever increasing erosion and degradation. Degradation and overuse of naturally vegetated areas (forests and pastures) is the main cause of these dramatic phenomena (see Figure 1.3). It is essential that the vegetative cover is rehabilitated to halt erosion. On agricultural soils, the potential erosion risk is moderate for 25 % (167,646 ha) and high for the 75% (442,200 ha).

![Distribution of areas according to erosion intensity](image)

*Figure 1.3 Distribution of areas according to erosion (Source: TRINITY ENVIRO ‘Study on reducing the soil erosion and sedimentation – NRDP 2010)*

Land cover and changes in land use

Forests and pastures cover about 54% of the Albanian territory (see Figure 1.4). Agricultural land covers only 24% (696,000 ha). After 1991, agricultural land in Albania was privatized. However, farmers have refused to use and get property and even abandoned some agriculture lands that are very unproductive and/or very remote, making them unprofitable for use in growing agricultural crops. Actually, there are about 108,000 ha under the category of refused/abandoned land.
The forest inventory of 2003 provided some data about the changes in the land use comparing satellite images from 1991 to images from 2001 (see Table 1.22). The results show a reduction of the forest area and a drastic increase in built up areas.

<table>
<thead>
<tr>
<th>Land cover types</th>
<th>Difference in spatial extent 1991-2000/1 (Ha)</th>
<th>Change in spatial extent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest</td>
<td>-163,297</td>
<td>-19</td>
</tr>
<tr>
<td>Thickets</td>
<td>-14,309</td>
<td>-6</td>
</tr>
<tr>
<td>Tree Crops</td>
<td>740</td>
<td>1</td>
</tr>
<tr>
<td>Herbaceous crops</td>
<td>38,614</td>
<td>8</td>
</tr>
<tr>
<td>Bare Areas</td>
<td>12,798</td>
<td>8</td>
</tr>
<tr>
<td>Shrub land</td>
<td>16,226</td>
<td>8</td>
</tr>
<tr>
<td>Aquatic vegetation</td>
<td>951</td>
<td>10</td>
</tr>
<tr>
<td>Grasslands</td>
<td>46,591</td>
<td>11</td>
</tr>
<tr>
<td>Woodlands</td>
<td>49,728</td>
<td>17</td>
</tr>
<tr>
<td>Water Bodies</td>
<td>14,737</td>
<td>23</td>
</tr>
<tr>
<td>Built up areas</td>
<td>20,040</td>
<td>80</td>
</tr>
</tbody>
</table>

Further development and extension of urban areas, construction of new roads and improvement of existing road infrastructures, establishment of new industrial/business facilities, etc., are clear signs that agricultural and forestry land will continue to diminish in the future.

**Decline of organic matter and biodiversity**

Soil erosion and other forms of land degradation directly affect the level of organic matter and soil
biodiversity. Unfortunately, there are no national scale data about the level of organic matter decline. A study made in the Vjosa river basin shows that due to erosion 127.5 kg/ha of nutrients are lost each year, including 9.87 kg/ha of nitrogen and 0.59 kg/ha of assimilated phosphorous.

**Organic carbon content in the soil**

Data on organic carbon content in the soil are missing. On a general basis soils on hilly and mountainous terrains have a lower organic carbon content than those of the lowland areas. The level of organic carbon content is effected by erosion as well since the top soil has the richer carbon content.

**Management of contaminated sites**

The UNDP project “Identification of Priority Hot Spots in Albania” has defined 14 hot spot areas (total area 235 ha) as areas highly contaminated by different pollutants including old fertilizers, mining dumps, solid waste etc., left over from former industrial sites and/or government deposits. The project has made an assessment of the situation and developed and implemented all measures for the rehabilitation of these sites.

The National Environmental Agency has monitored the status of soils around 6 oil fields in the country to assess the hydrocarbon pollution level. The monitoring results show that in all 6 oil fields the levels of hydrocarbons were 15% (5.5 times) higher than EU norms.

Landfills are another source of soil pollution since most of the landfills are not properly constructed and there is limited leakage control. Waste dumping around settlements is also a problem.

**B1.4.4 Institutional set up concerning soil management, legal and policy governance**

**Organization of soil management:**

The main central institution responsible for the development of policies, strategies and legislation related to soil management is the Ministry of Agriculture, Rural Development and Water Administration. The Directorate General of Water and Soil Administration is the specialized unit within the ministry that deals with soil management issues.

At a regional level, the institution in charge of soil protection and management is the Directorate of Soil Protection and Management. Additionally, each municipality has an Office for Soil Protection and Administration, which responds to the regional directorate.

The Agriculture Technology Transfer Center in Fushe Kruja (Tirana), which has inherited some of the duties and responsibilities of the former Soil Science Institute, is in charge for whatever research related to soil there is. The Agriculture University of Tirana is also conducting research and/or monitoring of soils in Albania.

The National Environmental Agency is conducting some monitoring of soil quality as part of the reporting for the Annual State of the Environment Report.

**Legal framework**

The land management is based on the following main legal dispositions:

- Law no. 8312, dated 26.03.1998 “On un-resituated agriculture lands”.
- Law no. 8318, dated 01.04.1998 “On renting procedures for agriculture land, forests and pastures of state property”.
- Law no.8337, dated 30.04.1998 “On the transfer of property of agriculture land, forest pastures and meadows”.
- Law no. 8743, dated 22.02.2001 “On state real estate properties”.
- Law no. 8744, dated 22.02.2001 “On the transfer of state property real estates to local government units”.
- Law no. 10263 dated 08.04.2010 “On the use of abandoned agriculture land”.
- Law no. 107/2017 “On urban planning”.

The legal framework of land administration is very complex. There are problems related to land registration and ownership. Arable land has already been privatized, but land registration remains incomplete. Land privatization has resulted in a large number of tiny and scattered farms. The current land administration is inadequate and the land market is under developed. There are only a few transactions, both in rental and sale market, all of the transaction being household-to-household and mostly informal. To avoid high transaction costs, land transactions are mostly informal.

**Implementation & approximation of EU legislation**

The EU Soil Thematic Strategy aims to protect the soil while using it sustainably. Considering the four pillars of this strategy, it can be noted that some progress has been achieved in issues related to awareness raising and integration of soil protection and sustainable use aspects on other sector strategies including agriculture, forestry, water management, industrial development etc.

Very little or no progress has been made in the field of research and legislation. There are few research efforts related to soil degradation issues and none of them are on a national scale. Even the monitoring of soil status and quality is not performed regularly by the institutions. Regarding the legal aspects, there has been no new or improved law on soil protection and sustainable use since 2004.

**B1.5 Overview of the Forestry/Water/Soil/Natural Resource Management projects in Albania**

The most important project in support of natural resource management in Albania is the Environmental Services Project. The main objective of the project is the enhancement of sustainable land management practices, followed by the reduction of land degradation and increasing target community income. Investments will be implemented through competitive grants, which, through the application process and extension advice, will support improved financial and business planning capacity. At the same time the implementation of the forest management plans will help address climate resilience issues through increasing the absorptive capacity of the landscape, reducing erosion and better management of water, forest and pasture resources. Through improved land use practices, the projects activities aim to reduce erosion and reversed land degradation, enhance the productivity of the land and improve the livelihood of local communities. Furthermore, the life span of downstream water infrastructures shall be increased and the ongoing maintenance costs reduced. Institutional capacity to support the local government units, user associations, forest extension service and ARDA to undertake monitoring and reporting will be built.

The project will introduce and support the establishment of a payment for environmental services scheme in Albania. A competitive grant financing support to rural farmers, women, their associations and local communities will provide more income generation opportunities and support government efforts for poverty alleviation in rural areas. Through its capacity building component it will pave the way for future support of the forest and pasture sector by the future EU rural development and agri-environment financing mechanisms that will be provided under the Instrument for Pre-Accession Assistance (IPA II).

The implementation of the national forest inventory and forest management information system will improve knowledge on the extension of forest resources and productivity in the country and assist policy development and planning. It will also facilitate monitoring and regular reporting to international bodies.
The water sector, mainly water supply, wastewater systems, irrigation and drainage, have been among the three main sub-sectors that have received most of the foreign assistance and will continue to be amongst the most foreign-financed sub-sectors in the years to come (2016 - 2020). In regard to water quality, two basic RBMPs will be developed in 2017, setting clear and prioritized criteria on water use based on specific conditions in each basin, allowing for monitoring according to WFD requirements and paving the way for developing the remaining RBMPs.

World Bank Group assistance programs in this area are coordinated with other major development partners active in the water sector, including SIDA, KfW, GIZ, ADA, USAID and the EU.

The water sector will also be supported under a new Protocol of Cooperation between the Government of Albania and the Federal Republic of Germany for the period 2016 - 2017, with one of the proposed priority areas being water and sanitation. A detailed list of ongoing and planned projects related to the water sector in Albania is provided in the Table 1.23 and Table 1.24.

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Project Title</th>
<th>Donor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARDWA</td>
<td>Water resources and Irrigation Project (WRIP)</td>
<td>WB &amp; Sweden</td>
</tr>
<tr>
<td>MARDWA</td>
<td>Flooding/Civil Emergency</td>
<td>IPA 2012</td>
</tr>
<tr>
<td>MARDWA</td>
<td>EU Recovery Programme for Floods</td>
<td>IPA 2012 &amp; 2013</td>
</tr>
<tr>
<td>MoE</td>
<td>Themis Network – Stage 2: Promoting regional cooperation in SEE via networking within the authorities responsible for the environment and justice sectors</td>
<td>Austria</td>
</tr>
<tr>
<td>MoE</td>
<td>ENVSEC; Transforming Environmental Security Risks into Cooperation in the South Eastern European Region (Phase II)</td>
<td>Austria</td>
</tr>
<tr>
<td>MoE</td>
<td>Climate change adaptation in Western Balkan (Regional Project)</td>
<td>GIZ</td>
</tr>
<tr>
<td>MoI</td>
<td>Second Component: Prevention/Preparedness against flooding and disaster management</td>
<td>IPA 2012 &amp; IPA 2013</td>
</tr>
<tr>
<td>AFD</td>
<td>Rural Water Supply Program (Phase I, II, III)</td>
<td>KfW</td>
</tr>
<tr>
<td>AFD</td>
<td>Wastewater system in Bilisht</td>
<td>Austria</td>
</tr>
<tr>
<td>AFD</td>
<td>Water Supply in Peskopia</td>
<td>Austria</td>
</tr>
<tr>
<td>MoEI</td>
<td>Energy Community of South East Europe APL Program – APL for Albania Dam Safety</td>
<td>WB</td>
</tr>
<tr>
<td>MoEI</td>
<td>Komani HPP Dam Safety Upgrade</td>
<td>EBRD</td>
</tr>
<tr>
<td>MoTI</td>
<td>Water sector investment project</td>
<td>WB</td>
</tr>
<tr>
<td>MoTI</td>
<td>Shkodra Water Supply Project</td>
<td>Switzerland</td>
</tr>
<tr>
<td>MoTI</td>
<td>Water Supply and Wastewater Project in Lezha city – Municipal infrastructure Program 1</td>
<td>Switzerland</td>
</tr>
<tr>
<td>MoTI</td>
<td>Rural Water Supply Project Orikum</td>
<td>IDB</td>
</tr>
<tr>
<td>MoTI</td>
<td>Municipal Infrastructure III &amp; IV</td>
<td>Switzerland</td>
</tr>
<tr>
<td>MoTI</td>
<td>Water and Wastewater system in Tirana – infrastructure rehabilitation and technical assistance to the Tirana Water Company</td>
<td>Italy</td>
</tr>
<tr>
<td>MoTI</td>
<td>The greater Tirana Wastewater System Improvement Project</td>
<td>Japan</td>
</tr>
<tr>
<td>MoTI</td>
<td>Support for water supply and wastewater infrastructure</td>
<td>IPA 2009</td>
</tr>
<tr>
<td>MoTI</td>
<td>Improvement of drinking water supply and wastewater systems</td>
<td>IPA 2010</td>
</tr>
</tbody>
</table>
Table 1.24 Planned projects financed through foreign funds (Source: Ministry of Agriculture 2015)

<table>
<thead>
<tr>
<th>Beneficiary</th>
<th>Project Title</th>
<th>Donor</th>
</tr>
</thead>
<tbody>
<tr>
<td>MoE</td>
<td>Sector fiche environment – intervention area 1 – climate change</td>
<td>IPA 2013 &amp; UN</td>
</tr>
<tr>
<td>ADF</td>
<td>Rural water Supply IV</td>
<td>KfW</td>
</tr>
<tr>
<td>ADF</td>
<td>Waste Management Supply</td>
<td>IDB</td>
</tr>
<tr>
<td>MoTI</td>
<td>Water and Wastewater</td>
<td>Italy</td>
</tr>
<tr>
<td>MoTI</td>
<td>Vlora waste water system</td>
<td>IPA 2012</td>
</tr>
<tr>
<td>MoTI</td>
<td>Municipal infrastructure (III – V)</td>
<td>KfW</td>
</tr>
<tr>
<td>MoTI</td>
<td>Waste management Program</td>
<td>KfW</td>
</tr>
</tbody>
</table>

B1.6 Evaluation of the main trends and gaps for natural resource management

Summarizing all the above, it can be noted that the main trends on forest resource management in Albania can be listed as follows:

- Broadleaf forests dominate over coniferous, with a large proportion of oak forests that are mainly used for fodder and firewood production. There is a large portion of degraded or open forest areas in the country. There are limited or no data about forest health and damages, particularly of forest diseases. Even reported data on some of the damages (forest fires, illegal logging) are not reliable and accurate since different sources report different data.

- The productivity of Albanian forests is low and the area of good productive high forest is reducing. The support of the forestry sector to the economy is therefore very limited. The contribution of forestry sector to the GDP cannot be calculated since it is aggregated to the contribution of the agriculture sector. The trade balance is negative and the employment rate very low.

- The government investments in forestry are focused on improving the state of the forests. However, the level of investment is not adequate and there are no investments supporting forest harvesting.

- Illegal and/or unregulated logging are continuing despite government efforts to control them. The government has set a ban on forest commercial activities with the aim to better control and eventually stop illegal logging. Similarly, in order to poaching, there is also a ban on hunting for a five-year period. Both these decisions have heavily influenced the level of income generated by the forest sector.

- Since 2016, the management of forest resources has been transferred to local government units (municipalities). The municipalities do not have the adequate human and financial resources to provide for a proper management of forest resources. There is no public forest management enterprise in Albania.
- The Directorate of Forest at the Ministry of Environment plays a limited role within forest management and cannot guide the sector development since there is little or no connection with the municipalities and their forest management departments.
- The management of forests within protected areas is under the National Agency for Protected Areas. These forests are mainly managed for their environmental function and biodiversity protection.
- Carbon sequestration is a great potential for Albanian forests. However, the identification of the right methodology and payment scheme is a challenge.
- A relatively high number of students continue to graduate from the Faculty of Forest Sciences yet the demand for forestry engineers is decreasing. On the other hand, while there are not many forest technicians who graduate from the forestry high school in Shkodra, there is a great demand for them.
- Addressing important cross cutting sectoral issues is highly dependent on international funding. The ESP project is an example of an integrated approach to the management of natural resources providing multiple benefits, ranging from better forest management, reduced land degradation and improved income generation and poverty alleviation in rural areas.

The main issues related to water resources management can be listed as follows:
- Water resources management in Albania is rather centralized and undergoes regular reform, but includes nonetheless overlapping responsibilities between central and local level institutes, resulting in a fragmented water sector with inefficient operations and a lack of transparency.
- Institutionally, Albania has implemented the framework needed for effective integrated water resources management. Moreover, most of the EU legislation is currently adapted to Albanian conditions.
- The main gap in applying IWRM principles is the high fragmentation of institutions involved in water resources management. About 50 different authorities, organizations and groups engaged in water resources management and development can be identified, most of which operate with limited sharing of information with other agencies. Furthermore, with respect to monitoring of water resources, 20 different government institutions are currently involved.
- Investment decisions related to water are often made on the basis of single sector considerations.
- Since water resources management issues are currently decided primarily at a central level in Albania, this has led to a lack of capacity at the basin level.
- A cross-sectorial institutional framework with informed stakeholder involvement in IWRM is missing and responsibilities are not clearly defined, with some responsibilities being duplicated or even contradictory.
- One of the main future issues is the autonomy and decision-making of the River Basin Councils (six) regarding water resources management issues.
- Effective data sharing is not yet a common practice in Albania and information gathering is rather complicated. This difficulty is caused by two reasons: (i) data required are simply unavailable (in the correct form), and; (ii) the lack of available human resources causes a lack of data exchange.
- A coordination strategy has been created at the highest political level in order to integrate the national sector water policies and sectoral views and interests in the development and implementation of the IWRM framework.

The main issues related to soil protection and administration can be listed as follows:
- All agricultural land is private. Land is highly fragmented and the average farm size is very small. There are problems with the land ownership and registration as the land market is under developed. Only 2/3 of the agriculture land is being cropped. Only 25 - 35% of land is under some form of irrigation. There is a large amount of abandoned land which is prone to degradation and erosion
- Soil erosion by water is a widespread problem affecting areas all over the country including both agricultural lands, forests and pasture areas. Loss of topsoil is severely affecting the productivity of these terrains.
- Land sealing is becoming a growing problem since large parts of agricultural land are being occupied with construction works, mostly private houses but also commercial facilities such as businesses, restaurants and hotels.
- Land pollution is another important issue. Soils around former industrial sites are highly polluted.
This is also true for soil around oil fields and oil drilling operations. Additionally, landfills all around the country and uncontrolled waste dumping are a source of soil pollution.

- There is limited data about the soil types and quality and their distribution around the country. There are no comprehensive studies and research about the issues of soil acidity, alkalinity, salinization etc.
- Land administration and protection is the responsibility of the Ministry of Agriculture, Rural Development and Water Administration. Land and water administration are under the same department within the MARDWA. Land administration structures are established at each municipality and region. However, the current land administration is inadequate.
- There is no strategy for land protection, although land protection and sustainable use is mentioned in several other sector strategies including agriculture and rural development.

All three sectors have undergone some reforms and restructuring mostly driven and supported by international donors. Additionally, legislation related to them is part of the approximation process with EU legislation. Several concepts and requirements from the EU legislation are transposed to existing laws. This has contributed to a rather complex and packed legal framework for all three sectors. Furthermore, law enforcement is a huge problem.

Current capacities, particularly at a local level, do not meet the required level of technical, financial and institutional capacities in order to deal with the needs related to the implementation of Integrated Resources Management and Implementation of the EU directives and requirements (including FLEGT, FORESTEUROPE, Bird Directive, Habitat Directive, WFD, and EU Soil Thematic Strategy).

**B1.7 Conclusions (status quo, trends and gaps regarding all three natural resources)**

By definition, forests have social, environmental and economic functions. Considering the low productivity of Albanian forests and the reducing area of good high forest, forestry in Albania is not a productive sector, which generates revenues or is at least self-sufficient. This is also topped by the ban on all forest commercial activities for a ten-year period.

Secondly, there has been an increase in the area of degraded or open forests most of which are transferred to municipalities. The transfer of forest management authority to local government units (municipalities) is a daring political action, placing the forest sector at a crossroad. Forest management is now closer to its users and it can better deal with issues related to supporting local livelihoods and all related social aspects. This offers the possibility to relate forestry and the forest sector more closely to rural development. Banning of all commercial forestry activities for 10 years also means that financial revenues from forestry activities will not be granted, but forest restoration, afforestation and sustainable forest management might be at the center of attention for the next years to come, which can be quite costly. The rural development strategy, which already includes measures related to forestry, should focus more on this sector as an important pillar of rural development.

Soil erosion is strongly related to the degradation of vegetation cover. Good practices of forest management can significantly reduce soil erosion. Therefore, land administration and forest authorities at both the municipality and ministry level should work together in identifying and implementing appropriate measures aimed at improving forest cover and halt soil degradation. However the forest, water and soil sectors compete with each other as well as with other sectors for funding. Currently the most important investments in all three sectors come from international funders.

The collection of data and monitoring of forest status is dispersed to different institutions. The municipalities are now in charge of collecting basic data and monitoring the overall state of the forests. The Directorate of Forest in the Ministry of Environment is still in charge of the forest register (cadastre) being the official source of data on forestry in Albania. However, this directorate will depend strongly on the data coming from
the municipalities to maintain an up-to-date forest register. But since there is no institutional connection between these institutions and no interlinkage the flow of data will be difficult and patchy to generate and manage. The National Environmental Agency is also in charge of forest and soil monitoring on selected aspects and selected areas. It is necessary that this monitoring is conducted on a national scale particularly with regard to forest health, soil erosion and pollution.

The transfer of authority over forests and pastures to communes was not associated with expected transfer of the specialists from the Forest Service to the municipalities. The municipalities have not yet understood their new roles and responsibilities, and notably they do not have the fiscal budget to fulfill them. Over the coming years there will be a continuous need to support municipalities with required expertise to address issues of sustainable forest management.

Water seems to be an abundant resource in Albania, with sufficient water quantities of acceptable quality. Actually, only 36% of available water is used for Energy and Industry (33%), food (2%) and people (1%). There is no estimation of the amount of water necessary or environmental and natural processes. External factors such as climate change will most likely affect water quantity, quality or both.

Hydropower accounts for 97% of Albania’s current domestic electricity generation. Public hydropower plant production represents 72.1% of total domestic production. The water supply system is suffering from high operating costs, low bill collection rates, and a high percentage of non-revenue water. This financial deficit is covered via subsidies, often covering 30% of the operational costs. There is limited maintenance of existing infrastructure, management with limited experience, and missing standard operational procedures.

All over the country about 626 irrigation reservoirs are used for irrigation. However, 200,000 ha of irrigated area require irrigation infrastructure reconstruction, 3,000 irrigation structures require reconstruction or replacement; 138 drainage pumping stations are now at the end of their lifespan.

Institutionally, Albania has implemented the framework needed for effective integrated water resources management. One of the main WFD requirements is to manage water resources at the appropriate scale(s) within integrated basin governance systems to reflect local conditions. The existence of six River Basin Councils and Authorities in Albania seems to be a sound basis for this principle, but the authorities currently lack the capacity needed to manage the water resources in an integrated and climate resilient manner.

There are a limited number of solid waste landfills that comply with environmental standards resulting in large volumes of waste still being disposed into rivers. Operation of wastewater treatment facilities has increased over the last decade, but performance in not yet sufficient. More investment and better maintenance is required to meet water quality improvements as required by European standards. The lack of primary wastewater treatment at source also means that industries can inadvertently discharge wastewater upstream of potable water sources used for downstream populations. Although most industries and mines have shut down, historically contaminated sites still pose a significant environmental and contamination risk due to lack of attention and regulations for environmental protection.

The soil sector is under Ministry of Agriculture Rural Development and Water Administration. There have been drastic changes in the land use and land management in the last 25 years. Actually, all agricultural land is private. However, land is very fragmented and farm sizes are small. There are still problems with land registration and ownership which limits the land market development. There are limited data about the soil types and quality and their distribution around the country.

Finally there is limited research on forest, soil and water issues. Universities, as excellent centers for research, are not focusing their research on the urgent needs of these sectors.

As a candidate to EU accession, Albania has a top priority of bringing together all international requirements and elaborating the instruments needed at a central and regional or local level for managing its natural resources (water, forest and soil) in a sustainable manner. Serious attempts are being made to approximate the Albanian legislation to EU directives. However, the establishment of adequate structures and capacities for the implementation and/or enforcement of all legal provisions is still weak.
B1.8 Recommendations for integrated management/intersectoral cooperation of the forest, water and soil resources in Albania

It is recommended to undertake policy reforms and develop programs to implement a coherent rural/environment/forestry strategy accompanied with realistic financing options in the long-term. The development of a joint investment strategy addressing cross-cutting issues of all three sectors (e.g. degradation of forest areas, soil erosion, sedimentation of water infrastructure) will help the government to plan for adequate funding and avoid overlapping investments.

In order to provide for better and closer cooperation, it could be useful to transfer the Forest Directorate to the Ministry of Agriculture, Rural Development and Water Administration. Since directorates responsible for the administration of these important resources (forest, water and soil) will be under the same ministry, it might be easier to develop and implement joint policies and strategies.

A comprehensive capacity-building program addressing all levels of administration should be developed and implemented. The program should cover capacities related to sustainable and multifunction forest management, good practices in reversing soil degradation, integrated approaches to resource management, understanding and assessment of ecosystem services, etc.

Projects, similar to the ESP should be developed and implemented in an attempt to build strong cooperation between the forestry, soil and water sectors by addressing issues related to forest management that can contribute to reduce soil erosion, improve land conservation practices and reverse land degradation.

Assessment and valorisation of ecosystem services should start as soon as possible. Pilot sites must be identified and selected methodologies implemented in order to understand the value of such services and possibly identify the flow of benefits. This can provide additional support to the implementation of integrated measures on sustainable management and offer wise suggestions on the use of forest, water and land resources.

Soil degradation is a slow, imperceptible process in which immediate dramatic effects rarely occur. Therefore, it is necessary to organize more activities for raising awareness about soil. Use of films and documentaries produced in Europe, or the use of other interesting tools could help address this particular challenge.

Research should be promoted to address soil, forest, water issues, and improve the knowledge base of these sectors. Particular attention should be paid to the identification of risk assessment methodologies and development of long-term land use change scenarios.

Aspects of soil protection, and the sustainable use of forest and water resources should be part of agricultural and rural development policy. Emphasis should be placed on issues like reducing erosion, securing and improving vegetation cover, retaining and improving organic matter (no fires), etc. The agri-environment schemes should specifically support sustainable forestry and soil protection operations. This can always be combined with biodiversity conservation.

The government needs to allocate appropriate funds for the rehabilitation of the contaminated industrial sites. Additionally, specific actions should be undertaken to provide for soil protection from solid waste pollution.
B1.9 Recommendations concerning follow up activities for improved national resource management in Albania

- Implementation of critical activities in critical locations to reduce land degradation in the short term.
- Awareness raising activities on the importance of improved natural resource management.
- Development of awareness raising tools (leaflets, documentaries, TV spots) on the benefits to be gained from sustainable management and wise use of natural resources.
- Establishment and support of a national working group/discussion forum on the coordination and cooperation of natural resource (forest, water, soil) management.
- Development and adaptation of a common methodology for Flood Hazard and Risk Mapping.
- Further development of water supply demand management, in order to improve the efficiency in use, conservation, recycling and reuse of water. This requires a major shift in the approach of water resources management, away from traditional supply development (construction of physical infrastructure to capture more water for direct use) to efficiency of use, conservation, recycling and reuse of water.
Reference list of the data used for the assessment

European Commission. 2015 - FLOOD PREVENTION AND MANAGEMENT. Gap analysis and needs assessment in the context of implementing the EU Floods Directive


INSTAT 2015 – Statistical data about Albania (http://www.instat.gov.al)


GIZ- Floods in Shkoder district. December 2010


Ministry of Agriculture. 1969 On the evaluation of the real situation of forests and the measures to be taken for the full utilization of the productive capacities of the country. Tirana 1969


MoE 2016 – Statistical data about the forestry sector

MoE – 2015 Strategic Policy for Biodiversity Protection.


REC 2015 “Pyjetdhetranzicioni”

Tresa, Ll. 1955 Forest Handbook. Tirana 1955

TRINITY ENVIRO 2010 ‘Study on reducing the soil erosion and sedimentation – NRDP 2010.


World Bank Delivery Issue-Decentralization and Service delivery in Albania: Governance of Water Sector 2011


**ANNEX B1.1**

**Supporting datasets**

<table>
<thead>
<tr>
<th>Year</th>
<th>EXPORT</th>
<th>IMPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Industrial Roundwood</td>
<td>Firewood</td>
</tr>
<tr>
<td></td>
<td>Quantity (m³)</td>
<td>Value (000/$)</td>
</tr>
<tr>
<td>1990</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1991</td>
<td>57</td>
<td>8</td>
</tr>
<tr>
<td>1992</td>
<td>604</td>
<td>63</td>
</tr>
<tr>
<td>1993</td>
<td>2,402</td>
<td>162</td>
</tr>
<tr>
<td>1994</td>
<td>1,000</td>
<td>138</td>
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<tr>
<td>1995</td>
<td>1,000</td>
<td>138</td>
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<tr>
<td>1996</td>
<td>1,000</td>
<td>138</td>
</tr>
<tr>
<td>1997</td>
<td>1,960</td>
<td>219</td>
</tr>
<tr>
<td>1998</td>
<td>17</td>
<td>129</td>
</tr>
<tr>
<td>1999</td>
<td>379</td>
<td>5</td>
</tr>
<tr>
<td>2000</td>
<td>379</td>
<td>577</td>
</tr>
<tr>
<td>2001</td>
<td>25,000</td>
<td>3,263</td>
</tr>
<tr>
<td>2002</td>
<td>29,300</td>
<td>602</td>
</tr>
<tr>
<td>2003</td>
<td>467</td>
<td>140</td>
</tr>
<tr>
<td>2004</td>
<td>467</td>
<td>140</td>
</tr>
<tr>
<td>2005</td>
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<td>140</td>
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<tr>
<td>2006</td>
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<td>140</td>
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<td>2007</td>
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<tr>
<td>2008</td>
<td>467</td>
<td>140</td>
</tr>
<tr>
<td>2009</td>
<td>467</td>
<td>140</td>
</tr>
<tr>
<td>2010</td>
<td>467</td>
<td>140</td>
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<tr>
<td>2011</td>
<td>8,466</td>
<td>616</td>
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<tr>
<td>2012</td>
<td>2,641</td>
<td>258</td>
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<tr>
<td>2013</td>
<td>53</td>
<td>6</td>
</tr>
<tr>
<td>2014</td>
<td>3,000</td>
<td>255</td>
</tr>
<tr>
<td>2015</td>
<td>3,000</td>
<td>255</td>
</tr>
</tbody>
</table>
Figure 1.5 Map of forest cover 2005-2015 (Source: “Pyjetëhtiranzicion”, REC 2015)

Figure 1.6 Map of 6 River basins in Albania

Figure 1.7 Monitoring Stations (as from NEA)
CHAPTER B2
Overview of the Natural resource management in Bosnia and Herzegovina

Bruno Marić, Sabina Hadžiahmetovic, Mihajlo Marković, and Jugoslav Bruić

B2.1 Introduction: General Information about Bosnia and Herzegovina

Bosnia and Herzegovina (BiH) is a country situated in the western Peninsula, Europe. The larger region of Bosnia occupies the northern and central parts of the country, and Herzegovina occupies the south and southwest. These historical regions do not correspond with the two autonomous political entities that were established by the internationally brokered Dayton Accords of 1995: the Republic of Srpska (RS), located in the north and east, and the Federation of Bosnia and Herzegovina (FBiH), occupying the western and central areas.

The capital of the country is Sarajevo with important regional cities being Mostar and Banja Luka. BiH is a south-east European country that geographically belongs to the Adriatic and Black Sea basin, that is, to the group of the Mediterranean and Danube basins’ countries. It is located in the central part of the Balkan Peninsula, between latitudes 42° 26’ and 45° 15’ North and longitudes 15° 45’ and 19° 41’ East. It covers 51,209.20 km². The total area amounts to 51,197 km² of land and 12.2 km² of sea. The total length of the BiH border is 1,537 km. The total population is 3,531,159 (Agency for Statistics, BiH, 2016).

BiH consists of three separate administrative units: the Federation of Bosnia and Herzegovina, Republic of Srpska and Brčko District of BiH. FBiH comprises 10 cantons with each canton having its own municipalities. FBiH has 79 municipalities, while the RS administrative structure has 62 municipalities. The town of Brčko is a special administrative unit; district. Municipalities and towns with local self-governance are the lowest level of the political and territorial structure within BiH. The last level of political and territorial distribution in BiH consists of municipalities and towns, where local self-governance is exercised (Annex II Map 1).

The GDP in 2014 was 13.96 billion euros. Products worth 4.438 billion euros were exported (2014); among the main export products were metals, clothing, and wood products. These products were exported mainly to: Slovenia (16.5%), Italy (15.9%), Germany (12.1%), Croatia (11.5%), Austria (11.1%), and Turkey (5.2%) (figures from 2015).

BiH is a significant agricultural region, with one-third of its land under cultivation or in pasture. The most fertile soils are in the north, along the River Sava valley. In hillier areas, land is used both for cultivation and grazing. Principal crops include corn (maize), potatoes, wheat, plums, cabbages, and apples. In Herzegovina and in the more sheltered areas of Bosnia, tobacco is grown. Sheep are the major livestock, although cattle and pigs are also raised, and apiculture is practiced. With more than 60% of the country forested, timber, as well as furniture and other wood products have been important exports.

In December 2014 the EU initiated a renewed approach to BiH, which provides for the re-sequencing of
the conditionality in order for the country to progress towards the EU and address the socio-economic challenges it faced. Following the adoption of a written commitment to reforms by the Bosnia and Herzegovina institutions and leadership, the renewed approach led to the entry into force of the Stabilisation and Association Agreement (SAA) between Bosnia and Herzegovina and the EU on 1 June 2015, replacing the Interim Agreement (IA) which had been in force since 2008. In July 2015, the country adopted a Reform Agenda aimed at tackling the difficult socio-economic situation and advancing the rule of law and public administration reforms. Its implementation has continued with meaningful progress. In September 2016, the EU Council invited the European Commission to submit its opinion on the EU membership application of Bosnia and Herzegovina, submitted in February (European Commission 2016).

B2.2 Assessment of the Forest Sector

B2.2.1 Forest resources and management

Forest area by management and protection regime

For BiH the last official National Forest Inventory (NFI) data available date back to the period 1964 - 1968 (data taken from GFRA, FAO, 2005). Although, these data are almost 50 years old, they have been used for many national and international reports as regards the status of forest resources up to now. This has led to questions as regards the reliability of data on forest resources as a basis for processes for planning and policy making. The 2nd NFI was conducted ten years ago in the period 2006 – 2009, but the data are still not published. In order to overcome this problem for the purpose of this report data from the FIRMA study (USAID, 2012) containing certain data from the second NFI were used. The latest data available of the 2nd NFI are presented in Table 2.1. Different categories of forest are reported.

<table>
<thead>
<tr>
<th>Vegetation form</th>
<th>Available surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic Forests</td>
<td>Non-Economic Forests</td>
</tr>
<tr>
<td></td>
<td>ha</td>
<td>ha</td>
</tr>
<tr>
<td>1. High forest</td>
<td>1,329,500</td>
<td>46,300</td>
</tr>
<tr>
<td>2. Coppice forest</td>
<td>843,200</td>
<td>158,700</td>
</tr>
<tr>
<td>1+2. All forests</td>
<td>2,172,700</td>
<td>205,000</td>
</tr>
<tr>
<td>3. Shrubbery</td>
<td>52,700</td>
<td>41,100</td>
</tr>
<tr>
<td>4. Barren</td>
<td>55,700</td>
<td>88,400</td>
</tr>
<tr>
<td>3+4. Shrubbery and barren</td>
<td>108,400</td>
<td>129,500</td>
</tr>
<tr>
<td>5. Other forest areas</td>
<td>3,300</td>
<td>3,100</td>
</tr>
<tr>
<td>6. All forest and forest land</td>
<td>2,284,400</td>
<td>337,600</td>
</tr>
</tbody>
</table>

These figures show a total of 3,231,500 ha of forest and other woodland, 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% of the total territory of BiH is covered with forest and other wooded land, one of the highest values in Europe.
As compared to the 1st NFI going back in the 1960’s (reporting a total area of forest and other wooded land area of 2.734 million ha), this means a significant increase of the 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%. 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 the inventory methodology from a taxation to a statistical approach, which makes the two data sets principally incomparable;
- Factual increase of forest area due to afforestation (minor) and natural reforestation in mainly abandoned land (major).

**Growing stock, increment and felling and carbon stock**

For BiH wood and timber are the primary products of forest management. A similar situation related to the underestimation of forest area using old inventory data holds true for quantities of growing stock and carbon stock. The data from the second NFI indicates a growing stock of 435 million m³ in BiH, amounting to 201 m³ per ha (Table 2.2). In total, this means that the growing stock is expected to be 23% higher than officially reported, e.g. in GFRA, 2010. The preliminary calculations resulted in values higher for biomass and carbon stock than officially reported (FAO FRA 2010); that is, 23% for biomass and 16% for carbon stock as compared to internationally reported data. This calculation is conducted with the data for productive forests as presented in the FIRMA study (USAID, 2012). For more accurate data related to carbon accounting it will be necessary to use a different method.

Recent NFI data (Table 2.2, USAID, 2012) suggest that 5.7 million m³ is harvested per year as a 10-years average in BiH. As compared to an annual increment of more than 11 million m³ this means that only around 50% 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%; even more marginal (FAO 2015).

<table>
<thead>
<tr>
<th>Forest types</th>
<th>Publicly Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 m³</td>
<td>m³/ha</td>
<td>000 m³</td>
</tr>
<tr>
<td>Growing Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Forests</td>
<td>299,630</td>
<td>282</td>
<td>53,968</td>
</tr>
<tr>
<td>Coppice Forests</td>
<td>35,710</td>
<td>87</td>
<td>46,412</td>
</tr>
<tr>
<td>Total</td>
<td>335,340</td>
<td>228</td>
<td>100,380</td>
</tr>
<tr>
<td>Total annual volume increment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High Forests</td>
<td>7,481</td>
<td>7.03</td>
<td>1,622</td>
</tr>
<tr>
<td>Coppice Forests</td>
<td>907</td>
<td>2.22</td>
<td>1,192</td>
</tr>
<tr>
<td>Total</td>
<td>8,348</td>
<td>5.67</td>
<td>2,814</td>
</tr>
<tr>
<td>Average annual felling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>4,416</td>
<td>4.15</td>
<td>446</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>307</td>
<td>0.75</td>
<td>598</td>
</tr>
<tr>
<td>Total</td>
<td>4,723</td>
<td>3.21</td>
<td>1,044</td>
</tr>
</tbody>
</table>

**Forest types and ownership by management regime**

Forests in BiH comprise a huge diversity of forest types, ranging from coastal Mediterranean forest to mountain forests in central BiH. Map 2 in Annex II shows the distribution of forests and the spatial patterns of coniferous forests in the highlands, mixed forests in the mid-altitudes, and broadleaved forests in the low-level terrains and floodplains.
Table 2.3 (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.

Table 2.3 Main tree species according to public and private forests (Source: Glück et al., 2010)

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>High forests</td>
<td>92</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>1) Beech</td>
<td>91</td>
<td>9</td>
<td>100</td>
</tr>
<tr>
<td>2) Fir, spruce and beech</td>
<td>97</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td>3) Scots and Austrian pine</td>
<td>96</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>4) Sessile oak</td>
<td>75</td>
<td>25</td>
<td>100</td>
</tr>
<tr>
<td>5) Other high forests</td>
<td>83</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>68</td>
<td>32</td>
<td>100</td>
</tr>
<tr>
<td>1) Beech</td>
<td>62</td>
<td>38</td>
<td>100</td>
</tr>
<tr>
<td>2) Sessile oak</td>
<td>52</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>3) Mixture coppice</td>
<td>73</td>
<td>27</td>
<td>100</td>
</tr>
<tr>
<td>4) Other coppice</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Data from the USAID study related to the latest NFI indicate that coppice forests amount to 1.252 million ha in total and to 843,000 ha in productive (economic) forests, i.e. almost 40% of productive forests. Although RS and FBiH share almost the same percentage of high forest, the coppice forests are remarkably larger in RS. The ratios of high forests and coppice forests are diametrically opposed when comparing public and private ownership. While the state owns 72% of high forests, private forest owners are predominantly found in relation with coppice forest (434,000 ha or 62% of total economic coppice forests) (Table 2.4).

Table 2.4 Ownership types by forest categories (Source: USAID, 2012)

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>%</td>
</tr>
<tr>
<td>High forests</td>
<td>1,063,400</td>
<td>72</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>408,700</td>
<td>28</td>
</tr>
<tr>
<td>All forests</td>
<td>1,472,100</td>
<td>100</td>
</tr>
</tbody>
</table>

B2.2.2 Forests in support of rural communities

Forest land ownership structure

According to the data from the 1st NFI, forest land in BiH is predominantly publicly owned. Table 5 shows the ratio of 80% public forests and 20% private forests with an almost equal share in both entities in RS and FBiH. The spatial patterns of private forest ownership are displayed in (Annex II Map 3) to compare both eco-regional forest distribution and forest cover percentage. One can see that the percentage of private forests is highest in the lowland areas whereas the forest coverage is the smallest, while state forests are located in areas with high forest cover.
Table 2.5 Forest land ownership structure (Source: NEAP 2003)

<table>
<thead>
<tr>
<th>Publicly owned forests %</th>
<th>Privately owned forests %</th>
<th>Forests owned by church %</th>
<th>Communal forests %</th>
<th>Total forest area</th>
</tr>
</thead>
<tbody>
<tr>
<td>80.7</td>
<td>19.3</td>
<td>-</td>
<td>-</td>
<td>2,709,769</td>
</tr>
</tbody>
</table>

Public forests and public forest companies

According to the constitution of BiH, the ownership of public forests rests with the two entities (FBiH and RS). This set up is important for 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 the Brčko district, there are only a few thousand hectares of public forests managed by the public forest administration. Still, the term “state forests” is widely used to refer to public forests and it can be recognized in both official documents and in day-to-day life. At the moment there are 15 public forest companies in Bosnia and Herzegovina. Two of them are in RS, while 13 other are distributed in the FBiH in cantons and some of them even within the municipality level.

Employment in the forest sector

According to official statistic sources and the annual information on forest management plans in FBiH there is an increasing trend for employment in forest sector (see Table 6). There is a significant increase as compared to the year 2012, when the forest sector in BiH employed in total 8,678 people, and in 2015, when the number of employees increased to 9,164 people. Similar trends are at the entity level with the exception of 2015 in the FBiH. It is important to mention that the numbers in Table 2.6 include forestry professionals and administrative and other workers.

Table 2.6 Employment in forest sector in BiH in the period 2012 – 2015 (Sources: Statistical bulletin for Forestry, Number 16, Institute for Statistic of Republic of Srpska 2016 and Annual information on forest management and management plans in the Federation BiH, Ministry of Agriculture Water management and Forestry for 2012, 2013, 2014 and 2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>FBiH</th>
<th>RS</th>
<th>Total BiH</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>4,393</td>
<td>4,285</td>
<td>8,678</td>
</tr>
<tr>
<td>2013</td>
<td>4,469</td>
<td>4,328</td>
<td>8,797</td>
</tr>
<tr>
<td>2014</td>
<td>4,801</td>
<td>4,437</td>
<td>9,238</td>
</tr>
<tr>
<td>2015</td>
<td>4,627</td>
<td>4,537</td>
<td>9,164</td>
</tr>
</tbody>
</table>

In 2014 employment growth was 8.9%. The wood processing industry employed 21,005 people, out of whom 12,235 were engaged in wood and wood products production and 6,570 were employed in furniture production (see Table 2.7).

Table 2.7 Number of employees in forest-based industries in 2013 and 2014 (Source: Statistical Yearbooks of Republic of Srpska 2015; Statistical Yearbook of FBiH 2015.)

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Division/Entity</td>
<td>FBiH</td>
<td>RS</td>
<td>BiH</td>
<td>FBiH</td>
<td>RS</td>
<td>BiH</td>
</tr>
<tr>
<td>Manufacture of wood and products of wood and cork</td>
<td>5,566</td>
<td>5,214</td>
<td>10,780</td>
<td>6,220</td>
<td>6,015</td>
<td>12,235</td>
</tr>
<tr>
<td>Manufacture of paper and paper products</td>
<td>1,668</td>
<td>608</td>
<td>2,276</td>
<td>1,615</td>
<td>585</td>
<td>2,200</td>
</tr>
<tr>
<td>Manufacture of furniture</td>
<td>3,444</td>
<td>2,644</td>
<td>6,088</td>
<td>3,764</td>
<td>2,806</td>
<td>6,570</td>
</tr>
<tr>
<td>Total</td>
<td>10,678</td>
<td>8,466</td>
<td>19,144</td>
<td>11,599</td>
<td>9,406</td>
<td>21,005</td>
</tr>
</tbody>
</table>
B2.2.3. Fostering competitiveness of the forest sector and added-value chains

Income structure and revenues of state forest companies

As previously mentioned, public forest companies in BiH are established by governments and assemblies. A public forest company in RS is called 'Šume Republike Srpske', while in FBiH these are cantonal forest companies. In Table 2.8 financial results of public forest companies in RS and FBiH for the period 2013 - 2015 are presented. One can conclude that public forest companies according to the officially available data, from 2014, reported negative financial results both in the FBiH (for the FBiH financial results are summarised for all public forest companies) and RS. In 2015 the situation was same for the FBiH, while in RS, Šume Republike Srpske reported positive financial results amounting to more than 5 million euros.

An analysis of the structure of the revenues (see Table 8) clearly shows that the primary product of public forest companies is wood, while the revenues from other sources have not reached a satisfactory level, especially in RS where in 2015 it reported only 943,664 euros, while in the FBiH for the same period 7,143,416 EUR.

Public and international funding and investments

In the Table 2.9 public and international investments in different branches of the forestry sector in BiH are presented. The main foreign investors in the forestry sector are the World Bank, the FAO and the EU with major investments in the national forest inventory, projects related to sustainable forest management and renewable forest resources.

<table>
<thead>
<tr>
<th>Public funding (e.g. subsidies) in euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting infrastructure</td>
</tr>
<tr>
<td>Road infrastructure</td>
</tr>
<tr>
<td>Human resources and qualifications</td>
</tr>
<tr>
<td>Investments in biological reproduction of forests</td>
</tr>
<tr>
<td>Preparation of management plans</td>
</tr>
<tr>
<td>Preparation of management plans related to hunting</td>
</tr>
<tr>
<td>Investments in information system</td>
</tr>
<tr>
<td>Construction and purchase of management buildings and other objects</td>
</tr>
</tbody>
</table>

Table 2.8 Income structure and revenues of State Forest companies (Sources: Annual information on forest management and management plans in the Federation BiH, Ministry of Agriculture Water management and Forestry, 2013 – 2015, Šume Republike Srpske 2013 – 2015)

<table>
<thead>
<tr>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR</td>
<td>EUR</td>
<td>EUR</td>
</tr>
<tr>
<td>F BiH</td>
<td>RS</td>
<td>F BiH</td>
</tr>
<tr>
<td>Total Revenues</td>
<td>86,541,782</td>
<td>91,430,117</td>
</tr>
<tr>
<td>Revenues from wood sales</td>
<td>79,271,832</td>
<td>90,048,645</td>
</tr>
<tr>
<td>Other revenues</td>
<td>7,269,950</td>
<td>1,381,472</td>
</tr>
<tr>
<td>Total costs</td>
<td>83,065,515</td>
<td>88,784,011</td>
</tr>
<tr>
<td>Gross profit/loss</td>
<td>3,476,267</td>
<td>2,646,106</td>
</tr>
</tbody>
</table>
International funding (in forestry projects)

<table>
<thead>
<tr>
<th>Project</th>
<th>Donor</th>
</tr>
</thead>
<tbody>
<tr>
<td>National forest inventory</td>
<td>The World Bank</td>
</tr>
<tr>
<td>Sustainable management of forests and landscape (ongoing project)</td>
<td>Global Environmental Fund (2,138,223 EUR)</td>
</tr>
<tr>
<td>Technical assistance for using wood energy to improve sustainable economic rural development and meet the 2020 renewable energy targets for the Western Balkans-WISDOM B&amp;H (Wood-fuel integrated Supply/Demand Overview Mapping methodology)</td>
<td>FAO and EU</td>
</tr>
<tr>
<td>Forest Development &amp; Conservation Project</td>
<td>The World Bank IBRD-IDA (4,660,318 EUR)</td>
</tr>
</tbody>
</table>

Forest products and services

Table 2.10 contains data relating to the value of the main marketed goods from the forest sector. In BiH wood and wood products are still the main sources of income, while NWFP products are still under-represented with less than 5% of the total value of main marketed goods. Data for the main marketed ecosystem services are not available for BiH.

Table 2.10 Quantity and value of marketed goods and services

<table>
<thead>
<tr>
<th>Value of main marketed goods in 2015</th>
<th>Wood and wood products: 175,297,658 EUR NWFP: 8,087,080</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of main marketed forest ecosystem services</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Contribution of the forest sector to GDP

In the Table 2.11 data related to the contribution of the forest sector to GDP for the period 2000 - 2015 are presented. One can see that while the national GDP is constantly growing, GDP in relation to forestry, logging and related service activities is not following that trend. The overall share in GDP decreased in the period 2000 to 2009 and after the global economic crisis there was slow growth and in 2015 the share of the GDP is almost 1%.


<table>
<thead>
<tr>
<th>Year</th>
<th>GDP in the BiH in 1,000 euros</th>
<th>Gross value added of forestry, logging and related service activities (euros)</th>
<th>Gross value added of forestry, logging and related service activities (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>6,043,267</td>
<td>82,768</td>
<td>1.37</td>
</tr>
<tr>
<td>2001</td>
<td>6,482,247</td>
<td>85,969</td>
<td>1.33</td>
</tr>
<tr>
<td>2002</td>
<td>7,149,081</td>
<td>95,351</td>
<td>1.33</td>
</tr>
<tr>
<td>2003</td>
<td>7,530,310</td>
<td>95,581</td>
<td>1.27</td>
</tr>
</tbody>
</table>
Trade balance

Data on the trade balance exist only for the years 2010 and 2011 (reference from the report BiH industry outlook Wood & Metal Processing Sectors, 2012, published by FIRMA (see Table 2.12).

Table 2.12 Trade balance in forest products (quantity and value) (Source: FIRMA 2012: BiH industry outlook Wood & Metal Processing Sectors, 2012)

<table>
<thead>
<tr>
<th>in BAM mil</th>
<th>Sales</th>
<th>Growth rate</th>
<th>Exports</th>
<th>Growth rate</th>
<th>Export</th>
<th>Structure of export 2011</th>
<th>Structure of sales 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/Sales 2011</td>
<td>2011</td>
<td>percent</td>
<td>2010</td>
<td>2011</td>
<td>percent</td>
<td>percent</td>
</tr>
<tr>
<td>Sawmill products</td>
<td>421.6</td>
<td>461.6</td>
<td>9.5</td>
<td>235.3</td>
<td>277.1</td>
<td>17.8</td>
<td>60</td>
</tr>
<tr>
<td>Veneer</td>
<td>84.9</td>
<td>91.7</td>
<td>8</td>
<td>22.1</td>
<td>25.1</td>
<td>13.4</td>
<td>27.3</td>
</tr>
<tr>
<td>Joinery</td>
<td>44.2</td>
<td>48.1</td>
<td>8.9</td>
<td>40.8</td>
<td>48.6</td>
<td>19.2</td>
<td>-</td>
</tr>
<tr>
<td>Other wood products</td>
<td>53.2</td>
<td>56.9</td>
<td>10.3</td>
<td>11.9</td>
<td>15.4</td>
<td>29.2</td>
<td>26.2</td>
</tr>
<tr>
<td>Furniture</td>
<td>320.6</td>
<td>336.6</td>
<td>5</td>
<td>312.7</td>
<td>348</td>
<td>11.3</td>
<td>-</td>
</tr>
<tr>
<td>Prefabricated houses</td>
<td>6.1</td>
<td>6.5</td>
<td>7.1</td>
<td>25.3</td>
<td>29.2</td>
<td>15.3</td>
<td>-</td>
</tr>
<tr>
<td>Total WP</td>
<td>924.4</td>
<td>1,002.9</td>
<td>8.5</td>
<td>650.7</td>
<td>747.5</td>
<td>14.9</td>
<td>74.5</td>
</tr>
</tbody>
</table>

One can see that all sub-segments of the wood processing industry are export-oriented. The BiH wood processing sector has the same top five export markets. The major export market for the entire wood processing industry is Germany with a 26% share of total exports (BAM 216.8 million) followed by Croatia with 20%, Italy with 14% and Austria and Slovenia with 7% and 6% respectively. In 2011 reported growth to Bosnian Convertible Marka (BAM) 1,002,900,000 while exports were reported to BAM worth 747.5 million. The main driver for the development of the wood processing industry in BiH is definitely export to foreign markets.
Illegal logging

Illegal logging has been recognized as a serious problem for the BiH forestry sector. Some environmental NGOs, such as the World Wildlife Fund (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 in BiH has been estimated to be 1.2 million m³ (WWF, 2008). Official national data suggests much lower figures. For instance, the Ministry of Agriculture, Water Management and Forestry of the FBiH reported that only 38.603 m³ of timber was illegally harvested in 2012, with a total value of BAM 1.902.347 (Ministry of Agriculture, Water Management and Forestry of the FBiH, 2013). Illegal logging is affecting private and public forest properties, but in private forest properties it is due to unclear property rights and abandonment of private forests as a consequence of war. In 2006, the governments of both entities recognized a need to adopt action plans to combat illegal activities in the forestry and the wood-processing industry sector. These focused on improving external auditing procedures and developing internal capacities of forest management enterprises. Recently, some cantonal forest management enterprises in FBiH 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.

B2.2.4. Protection forests and enhancing ecosystem services

Forest health and damages

As regards the forest health situation in BiH, Table 13 clearly demonstrates that human-induced pressures and natural disasters are the main damaging factors for forests. The two predominant causes are forest fires and human made damages such as illegal logging, and devastation (see Table 2.13).

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Total for period 2011 to 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RS</td>
<td>FBH</td>
<td>BH</td>
<td>RS</td>
<td>FBH</td>
</tr>
<tr>
<td>Human made</td>
<td>25</td>
<td>88</td>
<td>113</td>
<td>89</td>
<td>83</td>
</tr>
<tr>
<td>Damages by insects</td>
<td>48</td>
<td>0</td>
<td>48</td>
<td>45</td>
<td>1</td>
</tr>
<tr>
<td>Natural disasters</td>
<td>71</td>
<td>2</td>
<td>73</td>
<td>59</td>
<td>5</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Damages by forest fires</td>
<td>73</td>
<td>27</td>
<td>100</td>
<td>69</td>
<td>973</td>
</tr>
</tbody>
</table>

Damage caused by insects demonstrated an increasing trend in the period 2011 - 2014. Damages almost doubled in 2014 (88,000 m³) as compared to 2011. There was an increased number of forest fires in 2012, which was an extremely dry year. Damage caused by plant diseases does not show a significantly increasing trend.

Biodiversity conservation and management

BiH is one of the top five European countries richest 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).

The size of the protected areas in BiH accounts for approximately 2% of the country which is equal to 104,879.9 ha, far below the level of countries in region. At the moment there are two areas of strict nature reserve, three national parks, sixteen natural monuments, five protected landscapes and two protected areas with sustainable use of natural resources. In addition there are three Ramsar areas and three important bird areas (Republic Institute for Protection of Cultural, Historical and Natural Heritage RS, 2016). Forest certification in Bosnia and Herzegovina

All certified forests in BiH are publicly owned and certified by the Forest Stewardship Council (FSC). A total of 1,556,107.40 ha of state forests are certified by the FSC in BiH. There are no certified private forests. At the moment five state forest companies have a FSC FM/COC certificate (Unsko-sanske šume, Hercegbosanske šume, Šume Republike Srpske, Srednjobosanske šume and Šume Tuzlanskog kantona). There are 334 wood processing companies which possess a FSC CoC certificate (FSC, 2017). The forest certification process has been mainly driven by the interest of the export-oriented wood-processing companies and their need for better access to global markets. Since the wood processing sector in BiH is export oriented, with exports mainly to EU markets, process of the FSC certification will certainly continue in BiH in the future.

B2.2.5. Institutional set-up of the forest sector, legal and policy governance

Organization of the forest sector

The organizational set-up and institutional arrangements of the forest sector is shown in Figure 1. Direct competences in forestry are held at the level of entities (FBiH and RS) and the Brčko district. The institutions at these levels are responsible for forest policy-making, 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.

In RS, the most significant changes in the institutional arrangements for forestry in recent years entail the following: The Public Enterprise in RS has been transferred into a corporation of joint stock company in 2005; forest management units (FMUs) were reduced in RS from 44 to 23 in 2008; the Forest and Hunting Inspection was integrated 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. Forest resource management is carried out at the 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 of 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 all legal aspects relating to forest law and related legislation. It acts as a permitting unit; e.g. change of land use and forest management planning.
The FBiH Forest Office 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 performs overall inspection services safeguarding the implementation of all actions relating to the law on forests within FBiH. 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. In this respect, further important bodies are: the Cantonal Forest Office and the Cantonal Forest Inspection.

In RS, the Forestry Department within the Ministry of Agriculture, Forestry and Water Management is responsible for forests and forestry. The main implementing bodies are (WB, 2012) as follows: The Forestry Council, which is a forum for high level discussion on forestry and forestry related issues and developments, was 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 the forest sector, local communities, NGOs, forest owners and others. This currently includes JPS Šume RS and the Forest and Hunting Inspection. The Forest and Hunting Inspection was transferred from the MAFWM in 2005 to the General Inspection Service, which has a total of twelve Inspectorates. The Forest and Hunting Inspection 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 headquarter, 23 Forest Management Units (FMU), 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 basis, comprising of a number of forest Districts which in turn comprise a number of management sub units (FAO 2015).

Private forest owners in BiH are not organized in 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 Association of Private Forest Owners “Naša Šuma” can be seen as an exception. It was established in 2006 in the municipality of Čelinac (Republic of Srpska).

**Legal framework for forest policy**

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 the following:

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 FBiH of 14 April 2009 (Official Gazette of the Federation of BiH no. 36/09) the Law on Forests (Official Gazette of the Federation of BiH no. 20/02, 29/03and 37/04) is no longer in force as of 27th November 2009. As a preliminary solution pending the adoption of the new law on forests, the Government of the FBiH adopted the Regulation on Forests (Official Gazette of the FBiH no. 83/09, 26/10, 33/10 and 38/10). As per the Decision of the Constitutional Court of the FBiH no. U-28/10 of 23 March 2011 (Official Gazette of the FBiH 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 has not been adopted yet, the forest sector is legally unregulated at the level of FBiH.

The 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 a lowland and agricultural area, forestry plays a subordinated role due to the small area covered by forests and the minimal amount of harvesting operations (FAO 2015).

Implementation & approximation of EU law

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. A new legislative framework related to the import of wood products into the European Union – EU Regulation 995/2010 (EUTR) prohibits the placing of illegally harvested timber and wood products on EU markets and requests the application of due diligence systems from everybody in EU that places timber and wood products on market for the first time. This is a potential threat for export-oriented companies in the wood-processing sector that could hamper their activities due to the fact that BiH is internationally widely recognized as a country with a high level of corruption in the forestry and wood processing industry. Most forestry professionals in BiH are, however, not aware of the requirements of the EUTR and the consequences which this EU Regulation could potentially have on the forest and wood processing sector in BiH (Bećirović, 2013).

In order to better address and minimize potential threats to export-oriented wood-processing companies, an EUTR Action Plan for BiH was developed in March of 2013 by experts from the Forestry Faculty, University of Sarajevo with financial support from USAID – FIRMA project.

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 fulfill strict requirements of EUTR. The Action Plan has 17 inter-related activities that are directed toward establishment of preconditions for fulfillment of EUTR requirements and improvement of the current situation in the forestry and wood-processing industry. Intensifying efforts as regards the 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 the CITES convention. One of the main pillars of the Action Plan was a focus on improving human and institutional capacities in relevant institutions related to preventing and combating illegal activities in forestry and supporting forest certification process.

The project entitled: “Support to Implementation of the Birds and Habitats Directives in BiH” was funded by SIDA and managed by the EU Delegation. The project was implemented in period 2012 - 2015. The most important result of the project included: a prepared list of potential NATURA 2000 areas with codes, areas, species and habitats. In line with that, Guidelines for Preparation of Management Plans for NATURA 2000 areas and indicative Management plans for three potential NATURA 2000 sites were developed. The project supported the implementation of the Birds and Habitats Directives, more specifically transposition of the Directives’ provisions into the nature protection laws in Bosnia and Herzegovina (Republic Institute for protection of cultural, historical and natural heritage RS, 2017).

Phytosanitary aspects in forestry are prescribed by national forest legislation. Concerning 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. However recommendations from the EU in 2016 were to harmonize the system of official veterinary and phytosanitary control to European standards (MOFTER, 2016).

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 FBiH (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 MOFTER there is state-level public administration that deals with plant health protection.

The production of seed and seedlings is an important activity in BiH forestry, traditionally organized and controlled by public forest companies. Both entities have adopted legislative frameworks that regulate the production and commercialization of seeds and seedlings within 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 must be approved by a responsible institution in the FBiH while their quality has to be in accordance with national standards (FAO 2015).

B2.2.6. Forest knowledge base

State of forest inventories

For BiH the first and last official National Forest Inventory (NFI) was conducted in the period 1964 - 1968. The second NFI was conducted in the period 2006 - 2009, but has yet to be properly published.

Educational system & forests

Currently, the tertiary aspect of 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 studies at the University of East Sarajevo are organized within the Agricultural Faculty in Vlasenica (RS). Forestry studies at the University of Bihać are organized within the Biotechnical faculty in Bihać (FBiH). Forestry studies in Vlasenica and Bihać began just 4 - 5 years ago and it is still too early to
evaluate their impact on the overall forestry education situation in BiH.

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. During the school year 2012 - 2013, 1,304 students were enrolled in forestry and wood-processing secondary schools in RS, 1,052 of whom were male and 252 were female (Institute for Statistics of RS, 2013).

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).

### B2.3. Assessment of the Water sector

#### B2.3.1. Water resources and policy in the country

Hydrographically, BiH belongs to the Black and Adriatic Sea basins. Water is discharged from an area of 38,719 km$^2$ (75.7%) in the direction of the Danube river basin and from 12,410 km$^2$ (24.3%) in the direction of the Adriatic Sea basin. Out of the total water quantities, 722 m$^3$/s are discharged in the direction of the Danube river basin and 433 m$^3$/s in the direction of the Adriatic Sea basin. The mean annual precipitation for the entire BiH$^{10}$ amounts to 1,250 l/m$^2$. With a land area of 51,197 km$^2$ the total volume of storm water is about 64 x 109 m$^3$, i.e. the corresponding total runoff is 2,030 m$^3$/s. The average inland runoff from BiH is 1,200 m$^3$/s, and the average runoff coefficient is 0.57 (Water Management Strategy of the FBIH 2010).

#### B2.3.2. River basin management

In FBIH river basins are divided in such a way Water Agencies are responsible for their water resources management. The Water Agency responsible for water management for the Black Sea Basin is situated in Sarajevo and the Water Agency, responsible for water management for the Adriatic Sea Basin is situated in Mostar.

In RS, there is Public Utility (PU) “Vode Srpske”, situated in Bijeljina, which has sectors for Danube and Adriatic Basin at the RS territory: Sector for Water Management RBD Sava and Sector for Water Management RBD Trebisnjica.

For the purposes of water resources management, the Brcko District established the Department of Agriculture, Forestry and Water Management District, under the District Government.

**Water resources**

Thanks to favourable natural conditions of climate, topography, vegetation and geological features, BiH has abundant fresh water in the form of rivers, lakes and wetlands. A peculiarity is a network of underground rivers and streams in karst regions. There are several natural lakes in BiH. River lakes formed in the extensions of riverbeds and mountain lakes of glacier origin are found in the Dinarids. There are about 30 water reservoirs in BiH primarily, 90% belonging to the Adriatic Sea Basin and the rest to the Black Sea. Wetlands in BiH are home to rich biodiversity but are constantly under threat for loss of habitat due to changes in the hydraulic regime, fishing, water pollution, erosion and siltation. Table 14 summarizes the freshwater abstraction and water use in BiH which remained quite stable in terms of abstraction and use between 2011 and 2013.

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$^{10}$ The separation of flow in certain entities of BiH is not methodologically correct or even possible.
Table 2.14 Freshwater abstraction and water use in BiH, in mil. m³ (Source: Agency for Statistics of BiH, September 2016) Remark: No data was available for 2014 and 2015 regarding freshwater abstraction and water use.

<table>
<thead>
<tr>
<th></th>
<th>Unit</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh surface water abstracted</td>
<td>million m³</td>
<td>55.41</td>
<td>55.34</td>
<td>55.64</td>
</tr>
<tr>
<td>Fresh groundwater abstracted</td>
<td>million m³</td>
<td>274.55</td>
<td>273.42</td>
<td>273.25</td>
</tr>
<tr>
<td>Total freshwater abstraction</td>
<td>million m³</td>
<td>329.96</td>
<td>328.76</td>
<td>327.89</td>
</tr>
<tr>
<td>Total water use</td>
<td>million m³</td>
<td>150.7</td>
<td>150.2</td>
<td>150</td>
</tr>
</tbody>
</table>

River basins and topography

There are seven river basins in BiH, which are transboundary with cantons, entities, and other countries: Una and Sana, Vrbas, Bosna, Drina, Sava, Neretva and Trebisnjica, and Krka and Cetina. (See Annex II: Maps - Water catchment area in BiH)

The River Una, a right bank tributary of the Sava, forms a border between Croatia and BiH and has a watershed of 8,143 km² and a mean discharge of 290 m³/sec. The River Vrbas has a watershed of 6,274 km² and has a mean discharge of 10 m³/sec. The River Bosna has a watershed of 10,810 km² and mean discharge of 170 m³/sec. The River Drina forms a border between BiH, Serbia and Montenegro. It has a watershed of 19,570 km² and mean discharge of 370 m³/sec. The River Neretva is the most significant transboundary river basin in the Adriatic Sea watershed. The Neretva originates in BiH. Of its total length of 222 km only about 25 km lies within Croatia but this area includes two-thirds of the Neretva Delta, which is known for its globally significant biodiversity.

River basin management plan and implementation

**Sava River Basin Management Plan:** The Sava River Basin Management Plan (RBMP) has been developed according to the requirements of the EU WFD\(^1\) which establishes a legal framework to protect and enhance the status of all waters and protected areas including water dependent ecosystems, prevent their deterioration and ensure long-term, sustainable use of water resources. The Framework Agreement for the Sava River Basin (FASRB) coordinated by the International Sava River Basin Commission (ISRBC) has created the conditions for the preparation of the Sava RBMP according to the WFD. As the first step of this process the Sava River Basin Analysis (SRBA) was developed and published in 2009.

**Water Management Plan for Adriatic Sea Basin in FBiH:** A draft Management Plan for the Adriatic Sea was prepared and presented to the public for review in June 2016. The Plan contains the basic information on the water area of the Adriatic Sea on the territory of the FBiH. It consists of data on the status of surface water and groundwater, monitoring, protection objectives and water management, program of measures to achieve the objectives, economic analysis of water use, etc.

**West Balkans Drina River Basin Management:** The objective of the Project is to improve mechanisms and capacity of the Project Countries to plan and manage the transboundary Drina River Basin, incorporating climate change adaptation. This is a regional project encompassing three countries: Bosnia and Herzegovina, Montenegro and Serbia. The respective project will run from 2016 to 2020.

**Drina River Basin Nexus Assessment:** The objective of this Project is to foster transboundary cooperation in the Drina River Basin by identifying intersectoral synergies that could be further explored and utilized, and by determining policy measures and actions that could alleviate tensions or conflict related to the multiple uses of and needs for common resources and to assist countries in optimizing their use of resources. The Project encompasses three countries: Bosnia and Herzegovina, Montenegro and Serbia. The respective project will run from July 2016 to April 2017.

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B2.3.3 Flood management

Mountain hazard related to water (torrent, landslide)

Generally, various types and intensities of erosional processes, and a considerable number of torrents affect BiH. About 90% of BiH is affected by erosion and according to “The Register of torrents and erosion-prone areas in BiH” 935 torrential watercourses, covering the area of 12,969 km² (Water Management Strategy of the FBiH) exist. The regulation works as regards torrents and soil protection from erosion have been carried out so far with the aim of protecting structures, such as reservoirs, highways, recipients in inhabited places, etc.

In the area of BiH, landslides on natural slopes are frequent occurrences that endanger housing units, settlements, economic units and people’s life in addition to traffic safety on the roads, degrading agricultural and forest lands and they also lead to dislocation of surface and underground waters. Landslides in BiH commonly occur due to increased amounts of groundwater and the unplanned construction of houses and other buildings, uncontrolled cutting of forest, and mineral resources exploitation. The main reasons for the rise in the number of landslides in urban municipalities of BiH are illegal building on the slope areas. The process of registering of landslides and mapping is still in progress, while the final results are needed to install a system for monitoring before making of the map for the whole area (Report on the State of the Environment for BiH, 2012).

History of floods and consequences

In BiH the key flood events were registered at the beginning of January 2010 on the Rivers Una, Sana, Vrbas and Bosna. Main floods in the Drina basin were caused by the extreme precipitation in Montenegro and Serbia’s part of the river basins. Flow rate of the River Drina, at the confluence to the River Sava, was over 4,000 m³/s which is the highest flow recorded in the last 50 years (Floods in the Danube River Basin, 2010).

The most extreme flood disaster in the Sava catchment occurred in the BiH in May 2014. This resulted in a severe loss of human life, considerable damage to property, land, businesses and consequently to economic loss. Approximately 25% of the areas average annual rainfall fell within a few days. A summary of major flood events in BiH from 2010 to 2015 is provided in Table 2.15.

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected areas, municipalities</th>
<th>Extent of damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 2010</td>
<td>River Drina catchment, Municipalities of Bosanska Krupa, Domaljevac - Šamac, Orašje, Tuzla, Maglaj, Goražde, Foča - Ustikolina, Pale - Prača, Ravno, Čitluk, Čapljina, Stolac, Mostar, Trnovo, Iliđa, Novi Grad, Tomislavgrad, Drvar, Trebinje, Bileća, Nevesinje, Foča, Novo Goražde, Bratunac, Zvornik, Bijeljina</td>
<td>• 20,000 people affected, 5,000 houses flooded,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 6,000 people evacuated.</td>
</tr>
<tr>
<td>May 2014</td>
<td>Sava tributaries: Una, Sana, Vrbas, Vrbanja, Bosna and Drina and River Sava at Rača</td>
<td>• Nearly 15% of GDP lost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 13,200 km² flooded.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Over 1 million people in 46 municipalities affected.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 25 lives lost.</td>
</tr>
<tr>
<td>Aug. 2014</td>
<td>Northern and Western BiH. All areas along the Sava, Sava tributaries: Una, Vrbas, Banja Luka, Gračanica, Tuzla, Foča, Višegrad, Zvornik, Žepče, Lukavac, Zenica</td>
<td>• Some 200 homes evacuated.</td>
</tr>
</tbody>
</table>

Table 2.15 Summary of major flood events in Bosnia and Herzegovina, 2010-2015 (Source: Flood Prevention and Management, Gap analysis and needs assessment in the context of implementing the EU Floods Directive, September 2015)
**Flood risk management plan**

FBiH: Methods of preparing for a flood risk management plan are prescribed by relevant decree on content of the Plan for Protection from Adverse Effects of Waters. Up to now, the FBiH Water Agency organized an elaboration through expert and research institutions for the preliminary flood risk assessment for categories I and II of watercourses in FBiH for a 6 year period and the development of a methodology for the development of hazard and risk maps (for the Rivers Bosna and Neretva, and for some stretches along the Rivers Una and Sana).

RS: Methods of preparing for a flood risk assessment are prescribed in the Action Plan for Sustainable Flood Risk Management in the Danube River Basin with applications on Sava sub river basin in RS 2010-2021, prepared by the International Commission for the Protection of the River Danube. The RS Water Agency organized the elaboration of a preliminary flood risk assessment for watercourses in RS for a 6 year period, which serves as a base for defining flood defence needs.

A Flood and Drought Forecasting and Warning System is currently under preparation with the support of the World Bank, which will be funded by the regional Western Balkans Investment Framework (WBIF) within the Joint Flood Management in the Sava River Basin Project. The project will provide essential policy guidance and operational advice on enhancing convergence with EU Water Framework and Flood Directives. The project includes a Flood Risk Management Plan for the Sava River Basin, including a Program of Measures and Flood and Drought Forecasting and Warning System for the Sava River Basin.

*Remark: No correct data of the area and facilities protected against floods (utilised agricultural land, settlements, industrial facilities, railway lines, roads, embankments, etc.) are available.*

**B2.3.4 Water quality**

**Classification of the ecological state of water bodies**

The Law on Water of the Federation foresees, in its Article 32, the classification status of water bodies of surface water and groundwater determined on the basis of size of changes caused by human activities. Article 43 of the same law specifies that the government of the Federation shall issue regulations on the methodology for determining the types of surface water bodies and characterization of surface and groundwater bodies. Since regulations on the methodology, as well as parameters for determining classes of water bodies, have not been adopted, for display and illustration of the state surface water quality the still existing regulation on classification of waters and coastal waters is used within the limits of BiH.

According to Official Gazette BiH No: 19/80, there are IV classes of water bodies in FBiH. Regulation on water classification and categorization of watercourses in RS (Official Gazette RS No. 42/016) is based on two groups of criteria, and environmental and chemical status. According to Article 26 there are 5 classes of water bodies in RS.

**A map of the monitoring network**

In BiH, water quality monitoring has been systematically carried out in the period 1965 - 1991 on 58 river basin districts and sub-basins of: Una, Vrbas, Ukrina, Bosna, Drina, Neretva and Trebisnjica. Continuity of monitoring water quality was interrupted in 1991. Organized control of surface water quality has started again in 2000 in RS and in 2005 in FBiH, depending on the type of water bodies, river basin districts and relevant agencies. Water quality monitoring in the river basin district of the Adriatic Sea has begun in 2000. The analysis included some new sections to the river basin of Neretva and Cetina River. (See Annex II: Maps - Monitoring network of surface water quality in FBiH, RS and BD). Monitoring of the condition of the water quality in reservoirs / lakes, which directly affects the water supply of major settlements is being systematically implemented since 2003. Tests of biological, chemical and physical-chemical elements of water quality were carried out on Bocac, Drenova and Visegrad and Bilecko Lake. The quality of surface water in the BD is closely linked to and dependent on directly on quality of these waters in the FBiH and RS, with regard to geographic location of BD within the BiH.
**Surface water (ecological and chemical status)**

Systematic and continuous monitoring of surface water quality in the FBiH began in 2005. Between October 2005 and May 2009 analysis were made in the Sava River Basin. The biological, microbiological and physical-chemical elements of water quality were analysed. Re-monitoring of water quality in the Adriatic Sea river basin has begun in 2000. The analysis included, in addition to earlier, some new sections to the river basin of Neretva and Cetina River. (See Annex II: Maps - Ecological and chemical status of surface water bodies in FBiH and RS).

Testing surface water quality in the territory of the RS is performed annually from 2000. Tests of biological, chemical and physical-chemical elements of water quality were carried out on Bocac, Drenova and Visegrad and Bilecko Lake.

The quality of surface water in the BD is closely linked to and directly dependent on the quality of the waters in the FBiH and RS, with regard to geographic location of BD within the BiH. Tests of biological, chemical and physical-chemical elements of water quality are carried out every year on three watercourses; the Sava, Brka and Tinja.

**Groundwater (chemical and quantitative status)**

There is no legal framework for groundwater monitoring in BiH. Groundwater monitoring is only carried out for drinking water purposes. Since groundwater is predominantly used for public water supply, for the chemical status assessment the criteria were drinking water quality, according to the Rule on Drinking Water (Off. Gazette FBiH no. 40/10) and Rule on Sanitary Property of Drinking Water (Off. Journal of the RS no. 44/03). Most of the data collected for the purpose of status assessment are from chemical and microbiology analysis. Collected data are stored at different companies/institutes.

**Waste water treatment and reuse**

In BiH a small number of people are covered by wastewater treatment (it is estimated that 3% in FBiH and in the RS less than 1.43% of the population is covered). There are, in total, seven functional plants for wastewater treatment, located on the territory of BiH.

**FBiH:** In the FBiH today six plants for wastewater treatment, in Gradacac, Zepce and Srebrenik, on the Sava River Basin, and in Ljubuski, Citluk and Grude in the river basin of the Adriatic Sea exist and operate, to which the facility in Neum can be added, although it is located in the Republic of Croatia. One part of the facilities for treatment of urban waste water, which before the war was in operation or in the final phase of construction, still does not work. This is primarily related to facilities in Trnovo and Odzak at the River basin of Sava River, and facilities in Siroki Brijeg and Bosansko Grahovo, on the Adriatic Sea river basin. The test phase of the plant for wastewater treatment Butila in Sarajevo have been started.

**RS:** Only Trebinje has a facility for wastewater treatment in the RS. Wastewater from Lukavica and Kasindol are disposed in Sarajevo in the Federation. Also, Trnovo wastewater is directly transported into the river Zeljeznica, because WWTP in Trnovo in time of the war was devastated. Facilities in Bileca and Celinac were not functioning since 1981 and respectively in 1991, while WWTP in Milici was only completed up to about 20% and therefore never served its purpose (as construction works were only partially completed).

**BD:** In Brcko District there is no facility for treatment of urban wastewaters. Sources and treatment of waste waters in BiH for the period from 2011 to 2015 is summarised in Table 2.16.
Table 2.16 Source and treatment of waste waters in the 2011 - 2015 period (Source: Agency for Statistics of Bosnia and Herzegovina, September 2016)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total waste waters, in 000 m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from households</td>
<td>76,704</td>
<td>73,595</td>
<td>69,124</td>
<td>69,555</td>
<td>71,030</td>
</tr>
<tr>
<td>from agriculture, forestry and fishing</td>
<td>975</td>
<td>642</td>
<td>530</td>
<td>514</td>
<td>230</td>
</tr>
<tr>
<td>from industrial and construction activities</td>
<td>9,538</td>
<td>8,613</td>
<td>8,458</td>
<td>8,555</td>
<td>8,629</td>
</tr>
<tr>
<td>from other activities</td>
<td>11,552</td>
<td>15,836</td>
<td>15,600</td>
<td>14,306</td>
<td>13,775</td>
</tr>
<tr>
<td>Total purified waste waters, in 000 m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary treatment</td>
<td>445</td>
<td>1,802</td>
<td>1,725</td>
<td>1,668</td>
<td>1,657</td>
</tr>
<tr>
<td>Secondary treatment</td>
<td>798</td>
<td>1,222</td>
<td>2,088</td>
<td>2,102</td>
<td>2,792</td>
</tr>
<tr>
<td>Tertiary treatment</td>
<td>-</td>
<td>4</td>
<td>227</td>
<td>228</td>
<td>241</td>
</tr>
</tbody>
</table>

B2.3.5 Water demand

Currently, there is no record on the water use that could offer a clearer picture about the real volume of water tapped for different purposes and users.

**Water supply**

Most of the country’s water supply comes from groundwater aquifers (51% from karst aquifers and 38% from intergranular aquifers) and the rest from surface waters such as rivers (10.2%), lakes and artificial reservoirs (0.8%) (UNECE, 2011).

**FBiH:** 56% of population of FBiH have access to the public water supply system managed by water utilities. 94% are connected in urban areas, compared to a mere 20% in rural areas, and the remaining population relies on local supply systems or wells (Water Management Strategy of the FBiH).

**RS:** 48% of population in the RS are covered by municipal water supply systems, 12% by small water supplies owned and operated by a local community, and 40% use water from small local networks, individual wells or water collected from rivers and springs.

**BD:** About 30% of BD is connected to local water supplies without adequate quality control and the rest of the population of individual supply from sources such as shallow wells.

Table 2.17 shows a volume of water delivered to users in 2014.

Table 2.17 Volume of water delivered to users in 2014 (Source: Agency for Statistics of Bosnia and Herzegovina, September 2016)

<table>
<thead>
<tr>
<th>Bosnia and Herzegovina</th>
<th>Distributed waters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, thousand m³</td>
</tr>
<tr>
<td>139,865</td>
<td>107,846</td>
</tr>
</tbody>
</table>

**Water scarcity and droughts**

Drought is a natural phenomenon defined as sustained and extensive occurrence of below average water availability. Drought, as an adverse climatic phenomenon, has often occurred in recent years in the Western
Balkans and BiH. From the beginning of October through the end of May, there is usually no drought in most parts of BiH. The need for potential evapotranspiration is covered by precipitation. July and August are usually drier months especially in the southern parts of BiH. Sometimes September can be dry, but usually September marks the beginning of the recovery of the available soil water reserve. It was found that the strongest droughts occur in the Mostar area, which in 1952 a catastrophic drought with annual soil water deficiency of over 400 mm occurred. Very gentle droughts or no droughts at all were found in Bihac area. Severe droughts have caused enormous damage to agriculture in the years 2000, 2003, 2007 and 2011.

BiH is located in the part of Europe that is most exposed to climatic changes. Climate changes causing a significant increase in temperature in the cities and changes in the precipitation regime. In the future we can expect longer drought periods in summer, and more rain with less snow in the winter. All this is as a result of the changing hydrological regime (Climate change adaptation in BiH, 2012).

**Irrigation**

Up until 1992 irrigation systems in BiH covered a total of 19,570 ha: the Sava RBD – 12,600 ha (Semberija – 6,800 ha, central Posavina - 800 ha and Lijevče polje – 5,000 ha) and the Adriatic Sea RBD – 6,970 ha (The Neretva river basin – 5,540 ha, the Trebisnjica River Basin -1,130 ha and Karst Polje - 300 ha). However many of the systems were not completely functioning. After 1996, the situation became worse due to war damage and negligence.

According to unofficial data, only 1,612.5 ha or 0.2 % of arable land in the FBiH is irrigated in total. According to unofficial information, the present area covered by irrigation is as follows: the Sava RBD – the total of about 362.5 ha and the Adriatic Sea RBD – the total of about 1,250 ha (Water Management Strategy of the FBiH).

Of the total arable land (893,540 ha) area of 158,000 ha planned for irrigation in RS, 134,400 ha refers to the Sava River Basin, and the other part (23,600 ha) to the Adriatic Sea basin. In the Sava River Basin in RS only 3,439 ha of agricultural land, and in the Trebisnjica River Basin 3,823 ha, which amounts to 7,262 ha or around 4.5% of planned for irrigation land in RS were covered by irrigation systems. Now, due to non-maintenance and physical devastation, only about 1,700 ha or 1.076% of the planned for irrigation land remained in operation, what is around 0.2% from the total arable land in RS (Integrated Water Management Strategy in RS).

**B2.3.6. Institutional set-up of the water sector, legal and policy governance**

The responsible bodies for water management are defined, in accordance with the competencies division defined by the constitution of BiH. Figure 2 shows the institutional organization chart of the water sector in BiH (FBIH, RS and BD).
**Organization of the water sector**

At the state level, the Ministry of Foreign Trade and Economic Relations of BiH is responsible for the coordination of activities and harmonization of plans between bodies of entity governments as well as the institutions at the international level in the field of natural resources, environment protection, agriculture and energy. According to the constitution, water management is under the competence of two ministries: the Ministry of Agriculture, Water Management and Forestry (one in the FBiH, other in the RS) and the Department for Agriculture, Forestry and Water Management in BD and the Water Agencies.

Each canton is responsible for water management. Each consists of several municipalities which are, according to the FBiH “Law on principles of local self-government”, defined as the key local units in which citizens conduct local self-governance.

In the RS, which does not have cantons, municipalities are responsible for water protection.

In Bosnia and Herzegovina flood management is under the entity-level competence:

**FBiH:** Flood protection institutions competences and responsibilities are prescribed by the Federal Ministry of Agriculture, Water Management and Forestry (FMAWMF) through the Decree on flood protection plans. The Federal Meteorological Institute also plays an important role in the flood protection as it is obliged to update regularly data on precipitation, river water levels, the snow cover status and weather forecast.

**RS:** The relevant Ministry of Agriculture, Forestry and Water Management determines authorities in charge for flood protection and their responsibilities. The Ministry and the RS Government also cover the expenses of the flood protection costs. Republic institutes for hydrometeorology are in charge for: supervision, measuring, collecting and analysing hydro meteorological data as well as for weather forecasting.

**BD:** The Department of Agriculture, Forestry and Water Management of the Government of Brcko District entitles the registered and qualified companies to be engaged in flood protection in the areas where the flood protection structures exist, according to the law of the BD.

**Legal framework**

The basic legal document that regulates the issue of water management is the Law on Water. It covers water protection and use and the protection from the harmful effects of water. It also regulates the process of preparing river basin management plans and water management strategies, the definition of water property, issuing of water permits, basic requirements concerning water facilities and water management institutions, public participation in water management, financing of water management, etc.

In FBiH, water management is managed according to the Law on Water of the FBiH, adopted in 2006 (Official Gazette FBiH No. 70/06). This law stipulates adoption of a large number of by-laws, most of which have already been adopted, but some are still missing or are in the process of preparation. The Law on Water, which is currently valid in RS presents the legal framework for water management and was adopted by the National Assembly of the RS on May 11th 2006 (Official Gazette RS No. 50/06). An order of the supervisor for Brcko District on August 4th 2006 transposed the RS Law on Waters as the Law of the Brcko District (Official Gazette of RS, No. 10/98). All by-laws that had been adopted by the time of adoption were also transposed into the RS Law on Waters. Water policy BiH is defined by the water strategies: Federal Water Management Strategy in FBiH adopted in 2011 and Integrated Water Management Strategy in RS were adopted in 2016.

**Implementation & approximation of EU law**

The legal transposition of the WFD was carried out in BiH by amending the Water Law of entities and adopting the Law on Waters of FBiH (Official Gazette of FBiH No. 70/06) (hereinafter the Water Law of FBiH) and the Law on Waters of RS (Official Gazette of the RS, No. 50/06 and 92/09) (hereinafter the Water Law of RS). The Water Laws of the entities transposed the key requirements of the WFD. Following a general legal practice, the detailed regulatory tasks for the implementation of the Water Laws must be
laid down in secondary legislation. That is why, the detailed substantive provisions on the assessment, monitoring and the presentation of the status of waters are to be legally implemented in the format of by-laws, adopted by the entities and the District Brcko. The entities already made significant efforts to align the legislation with the WFD and with the other EU water related legislation. The entities and the District Brcko transpose the requirements of the EU water legislation individually (separately). Data from the report on the progress for FBiH/BiH in the period May 2011 – March 2012 are listed in the Table 2.18.

Table 2.18 Review of EU Directives in the water sector (Source: Ministry of Agriculture, Water Management and Forestry (FBiH), 2016)

<table>
<thead>
<tr>
<th>Directive</th>
<th>EU Directives in jurisdiction FMAWMF</th>
<th>Transposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Framework Directive (Dir. 2000/60/EC)</td>
<td></td>
<td>91%</td>
</tr>
<tr>
<td>Urban Waste Water Treatment Directive (Dir. 91/271/EC)</td>
<td></td>
<td>93%</td>
</tr>
<tr>
<td>Nitrates Directive (Dir. 91/676/EEC)</td>
<td></td>
<td>60%</td>
</tr>
<tr>
<td>Groundwater Directive (Dir. 2006/118/EC)</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>Environmental Quality Standards Directive (Dir. 2008/105/EC)</td>
<td></td>
<td>64%</td>
</tr>
<tr>
<td>Floods Directive (Dir. 2007/60/EC)</td>
<td></td>
<td>71%</td>
</tr>
<tr>
<td>Freshwater Fish Directive (Dir. 2006/44/EC)</td>
<td></td>
<td>11%</td>
</tr>
<tr>
<td>Shellfish Directive (Dir. 2006/113/EC)</td>
<td></td>
<td>0%</td>
</tr>
</tbody>
</table>

EU Directives in jurisdiction of government ministries:

<table>
<thead>
<tr>
<th>Directive</th>
<th>Transposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water Directive (Dir. 98/83/EC)</td>
<td>97%</td>
</tr>
</tbody>
</table>

B2.4 Assessment of the soil management

B2.4.1 Status of the soil data

Land and soil resources are among the most significant natural resources in BiH, with the primary function being the production of food and raw materials. The main consistent source of soil data was derived from the basic soil map of BiH at a scale of 1:50000. Most of the older soil maps have been classified according to the modified Yugoslav classification system (1985). During the implementation of the FAO project “Inventory of the Post-War Situation of Land Resources in BiH” (2000 - 2002) all sheets of the BiH soil map were scanned and digitized. The same was done for the analytical data (physical and chemical properties) from all annexes containing soil profiles. The old classification was translated into the new soil classification system of BiH as well as into the FAO classification and all information is now available in GIS format.

With the future use of resources, as well as population growth and development, society will need greater quantities of food – more intensive agriculture, construction of new settlements and industries, roads and transportation, exploitation of different raw materials, etc. which will potentially increase demands on the soil. One of the most important issues is low awareness of the significance of soil as people do not understand the importance of soil resources, resulting in weak policies for soil protection.

B2.4.2 Monitoring of soil

**Status of soil**

The soil cover in BiH is very heterogeneous (Annex II: Map 12). Terrestrial (automorphic) soils cover 86% of the total BiH surface area, while the hydromorphic soils cover the remaining 14%. The most widespread soil types are: Calcomelanosol (Cambicsoil on limestone and dolomites) which covers 21.45%; Dystric
Cambisol (acid brown soil) which covers 17.71%, and; Calcocambisol (brown soil on limestone) on 17.15% of BiH surfaces. The most widespread hydromorphic soils are Fluvisol and Pseudogley soil type.

The total area of agricultural land in BiH is about 2,158,271.4 ha, while the total area of forest land is about 2,795,090.0 ha (see Table 2.19).

Composition of humus in agricultural soils is around 50% lower than in soils covered by forest vegetation. Due to farming and treatment methods applied, the content of humus in agricultural soils shows a tendency toward further decline. Bearing in mind the climatic conditions and relief in BiH, soil salinity and soil sodicity are not problem, meaning that these two characteristics of the soil in BiH are not considered as natural constraints.

The main characteristics of soils in BiH are: acid soils cover around one-third of the total land, humus content is low, content of the most important nutrients is low, especially in phosphorus, soils are mainly shallow (deep only at alluvial areas and in the north BiH: Lijevče field, Posavina, Semberija), excess water on about 14% of the territory, inadequate care of soil fertility management and its improvement, water erosion is quite a present problem, particularly on sloping land, which is dominant in BiH. High quality soils account only 15%, moderate quality 22%, while the rest is classified as low quality (32%) and very low quality (30%) soils of the total BiH land resources (see Table 2.20).

Numerous causes of soil degradation are present in BiH, such as: surface exploitation of different raw materials, building of settlements on arable areas, landfills, water accumulations, construction of infrastructures (roads, railroads, etc.), industrial facilities, occurrence of water erosion and landslides, presence of landmines and drought.

At the BiH level an update of the Corine land cover project was done. The creation of a collection of soil quality and pollution monitoring data according to the Lucas System and funded by IPA is in progress. Relevant methodology for collecting data from approximately 1,000 points (and eventually expanded to 10,000 points of monitoring, if funding is made available) is expected in the near future.
In the RS, regular soil quality and pollution monitoring is conducted in the area of Banja Luka, Prijedor, and Čelinac city and BD. Soil monitoring in FBiH is conducted by the Federal Institute for Agropedology in Sarajevo within the program of permanent monitoring of agricultural land proposed by the Institute for Agropedology or the cantonal Ministry of Agriculture, which contains all relevant data on a periodic or continuous monitoring of land.

In FBiH this network has been active for three years already, and it has collected soil pollution and quality monitoring from 260 points throughout FBiH. Currently, there is the creation of the soil pollution cadastre in cooperation with Civil Protection of FBiH. Parameters monitored are: heavy metals, organic pollutants and radioactivity.

A functional system for soil monitoring in RS and FBiH, however, has not yet been established. Reporting systems are in the process of being established in accordance with EEA indicators and EIONET requirements. This essentially represents the unification and complementing the results of the above requirements to have a uniform system of soil quality monitoring according to the EEA and EIONET.

Two fundamental obligations of BiH (both Entities: FBiH and RS and BD) regarding soil resources arise from the ratification of the UNCCD as every member state has to submit an annual and/or biannual report on the status of the UNCCD implementation in BiH, and elaboration of the Action Plan (UNCCD AP BiH) and the Sustainable Land Management combating the Land Degradation/Desertification in BiH.

**Indicators for assessing the risk of land degradation**

There are several indicators for assessing the risk of land degradation. They are described in AP UNCCD BiH: “Land Cover Status”, “Increase in the level and diversity of available funding for combating desertification/land degradation and mitigating the effects of drought”, “Development policies and measures address desertification / land degradation and mitigation of the effects of drought”, “Water availability per capita”, “Drought”, “Land Use Change”, “Land degradation level”, “Land under SLM”, “Landslides”, and “Contamination”.

**B2.4.3 Soil degradation**

**Erosion**

Hilly terrain and a relatively huge quantity of precipitation in BiH means that a significant proportion of the BiH territory is exposed to water-induced erosion. This phenomenon is most prevalent in central and southern parts of the country where the annual quantity of precipitation amounts to no less than 2,000 mm. As more than 80% of the BiH territory exists on slopes exceeding 13% water-induced erosion is an increasingly present problem, especially in surfaces that suffered from unplanned exploitation of forests and total deforestation of the terrain. In the northern part of BiH hydromorphic soils are dominant on flat and slightly hilly terrains. In those areas erosion risk is at a much lower level from the point of view of potential erosion, but agricultural production is the basis of the intensive development of erosion processes, and on these soils surface erosion happens. In addition, besides water erosion, one should not forget the risks of aeolian erosion in the southern part of the country where shallow soils dominate on limestone/dolomite substrata with extensive vegetation or without and the risk of aeolian erosion is high.

There are no official data for BiH as regards areas affected by erosion, and no erosion monitoring system is in place. The current data are of partial character, usually collected at the municipality level through various project activities.

Designing an erosion map of SR BiH was completed in 1985. Two copies of the erosion map were then made. During the war (1992 - 1995) both copies were destroyed. The total average amount of sediment created on the territory of SR BiH per year is 16,518,031 m³, or 323 m³/km².

The new Erosion Map of RS (Annex II Map14) was designed in two phases (restructuring of erosion map and innovation of erosion map) during 2011.
The “Strategy for Agricultural Land Management” of FBiH defines that it is necessary to plan and build at least ten measuring stations for soil erosion, but also theoretical methods such as the USLE method to predict the intensity of erosion in the area of FBiH, and making maps of erosion and landslides is necessary.

**Land cover and changes in land use**

BiH does not currently have a system of permanent monitoring of land. That is the reason why the Third Level Classification of the CORINE database 2000 - 2012 and the data related to the mapped changes bigger than 5 ha, are used for the present analysis of the state and losses of land (temporary and permanent). The structure of the total permanent and temporary losses of land, 7,386.25 ha or 88.64% is related to the transition of agricultural surfaces into the class artificial surfaces. The average loss of agricultural land (from 2000 to 2006) was 1,231 ha annually. The decreasing trend for the period 2000 - 2012 clearly points to the conversion of agricultural into artificial surface (8,658.45 ha), abandonment of agricultural land and conversion to forest areas (2,329.47 ha), and water areas (318.70 ha).

Forest land is also used for construction of diverse infrastructural utilities and permanent and temporary losses of this resource are quite frequent. Analysis shows that, from 2000 to 2006, 946.42 ha of forest land was converted into a group category of artificial surfaces, of which broad-leaved forests take up 521.97 ha, and the average annual loss of forest land accounts for 157.74 ha. The biggest changes relate to an increase in the class mineral extraction sites (435.41 ha or 46.10%) and discontinued urban fabric (24.35% or 230.47 ha) and the smallest loss of 7.11 ha is related to the loss caused by construction of a sports-recreational surface.

**Decline of organic matter and biodiversity**

Instead of organic matter the content of humus is determined as an indicator for soil fertility used for the recommendation of ameliorative fertilization or organic food production in BiH. The soil organic matter is approximately about 0.5% in the majority of soils in the RS as well as in the soils of the FBiH.

Systematic monitoring of changes in the contents of the soils’ organic matter in the territory of BiH has not been established to date. The assumption is that there has been a decrease in the contents of organic matter, which for now cannot be quantified at the entity levels, so this has to be included in soil monitoring in order to have this data available in the future.

**Organic carbon content in the soil**

A functional system for the analysis of organic carbon and a monitoring network in RS and FBiH has not yet been established. However, according to the map of organic carbon content in top soils in Europe (Annex II: Map13), which have been prepared for use by JRC of the European Commission, it can be stated that the majority of soil in RS and FBiH fall into two classes: class 2 - 6% organic carbon content in top soils, and; class 1 - 2% organic carbon content in top soils.

**Management of contaminated sites**

Potentially the largest and the most vulnerable areas are located in the central and north-eastern part of BiH (Tuzla and Zenica Cantons), and on surfaces of all urban agglomerations due to high density of industries, such as mining, etc. In BiH, coal is exploited over the area of 18,000 ha, whereas the area for disposal of waste materials covers almost 6,000 ha. The largest mining areas are in the Municipalities Tuzla, Ugljevik, Gacko, Kakanj, Stanari and Prijedor. Coal mines in BiH are: Banovići, Đurđevik, Kakanj, Zenica, Breza, Bila, Kreka, Sanski Most, Livno, Gračanica, G. Vakuf/Uskoplje, Ugljevik, Miljevina, Gacko and Stanari. There are presently nine metal and non-metal mines: Olovo, Bužim, Vareš, Jajce, Veovača, Čitluk, Posušje, Široki Brijeg and Bosanska Krupa.

The “National State of the Environment Report” of BiH dating back to 2012, states that a number of registered waste disposal sites (49 in FBiH, 41 in RS, 1 in BD) were functional in 2010. It was also estimated that around 1,100 illegal (“wild”)umpsites are still in use. Although the negative impact of all forms of contamination on the environment and soils in BiH is known, there have been only a few studies to date. Nevertheless, it is encouraging that, in the territory of FBiH, the Federal Institute for Agropedology
established monitoring of contamination levels in soil with heavy metals and organic pollutants. In addition there is monitoring of heavy metal and organic pollutants contents in the FBiH, whereas in RS and BD there are no such activities but only partial studies.

The level of landmine and other residual explosive materials contamination represents a special problem in BiH. Unexploded mines placed in the range of two to five kilometres on both sides of the demarcation line deserve special attention in consideration of this issue. However, data on the number of mines and minefields in BiH are neither reliable nor complete. In the database of the Bosnia and Herzegovina Mine Action Centre (BHMAC) there are 19,000 registered reports on minefields. It is estimated that they represent only around 50 - 60% of their realistic number. According to BHMAC’s data, the current size of suspected mine areas is 1,262.82 km² or 2.5% relative to the country’s total surface area: 938.90 km² in FBiH, 298.89 km² in RS, and 25.03 km² in BD. Given the regular daily demining activities, the landmine contaminated areas are decreasing in size. However, considering the large-scale flooding in May 2014, it is estimated that landmine fields were shifted, but there are no official data yet.

B2.4.4 Institutional set-up concerning soil management, legal and policy governance

Organization of soil management

There are two bodies responsible for the coordination of environmental (Figure 3) and soil protection issues in BiH: (a) the Sector for Natural Resources, Energy and Environmental Protection within the MOFTER and (b) the Inter-Entity Steering Committee for the Environment.

Responsible institutions in charge of decision-making and implementation processes with regards to soil at the entity level are:

- The Ministry of Agriculture, Forestry and Water Management of the RS,
- The Ministry of Agriculture, Water Management and Forestry of the FBiH and
- The Department of Agriculture, Forestry and Water Management of the BD. Some aspects of protection and spatial planning for soil are under next institutions:
- The Ministry of Spatial Planning, Construction and Ecology of the RS,
- The Ministry of Spatial Planning of the FBiH
- The Ministry of Environment and Tourism of the FBiH and
- The Department for Spatial Planning, Property Rights Matters of the BD.
Figure 2.3 Environmental Management in BiH

Legal framework

Soil management is based on the following main legal acts:

- The Law on Agricultural Land in RS (Official Gazette RS, No. 93/06, 86/07, 14/10, 5/12).
- The Law on Agricultural Land in FBiH (Official Gazette of FBiH, No. 52/09).
- The Law on Agricultural Land in BD (Official Gazette BD, No. 32/04).
- The Law on Mining in RS (Official Gazette RS, No. 107/05, 75/10, 59/12).
- The Law on Mining in FBiH (Official Gazette FBiH, No. 26/10).
- The Law on Spatial Planning and Construction in RS (Official Gazette RS, No. 55/10).
- The Law on Spatial Planning and Land Use in FBiH (Official Gazette FBiH, No. 2/06).
- The Law on Spatial Planning and Construction in BD (Official Gazette BD, No. 29/08).
- The Law on Construction Land in RS (Official Gazette RS, No. 112/06).
- The Law on Environmental Protection in RS (Official Gazette RS, No. 71/12).
- The Law on Environmental Protection in FBiH (Official Gazette FBiH, No. 33/03).
- The Law on Nature Protection in RS (Official Gazette RS, No. 50/02, 59/08, 113/08).
- The Law on Environmental Protection in BD (Official Gazette BD; No 24/04).
- The Law on Environmental Protection Fund in RS (Official Gazette RS, No. 51/02, 53/07).
- The Law on Environmental Protection Fund in FBiH (Official Gazette FBiH, No. 33/03).
The main document that addresses soil issues is the AP UNCCD BIH.

Other relevant documents and strategies include:

- The Poverty Reduction Strategy Paper, adopted in 2004
- The Spatial Plan of RS until 2025.
- The Spatial Plan of FBiH until 2028.
- The Spatial Plan of BD until 2017.
- The Basis for Agricultural Land Protection, Use and Restructuring of RS as the Component of the Land Use Planning Process in 2009.

**Implementation & approximation of EU legislation**

In 2005, BiH with its entities, RS and the FBiH, signed a memorandum of understanding and mutual cooperation and support in the development of national systems for environmental monitoring (MoU) with the European Commission. According to this document there is an obligation that the implementation of all activities in this field must be in accordance with Directive no. 1210/90, 933/1999 and 1641/03 and recommendations from the EEA and the EIONET. Depending on the data source, some reports have been made, but there is no statistical consistency in the data provided.

Up to now the EU Thematic Soil Strategy and the topics addressed in the Strategy are not recognized in the current legislation about soil as the natural resource in BiH. Only two pillars of the EU Thematic Soil Strategy, awareness raising and research, are sporadically included in some strategic approach. The EU nitrates directive (Dir. 91/676/EEC) is referred to in some rulebooks about harmful substances for soil.

**B2.5 Overview of the Forestry/Water/Soil/Natural Resource Management projects in the country**

A total of 11 projects (medium to high scale) are currently implemented across the country.

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Implementation Start/End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of sustainable management of forests as support to sustainable development in BiH - funded by IKEA and WWF.</td>
<td>2012 - 2016</td>
</tr>
<tr>
<td>Sustainable management of forests and landscape - funded by GEF.</td>
<td>2014 - 2019</td>
</tr>
<tr>
<td>Protection of nature and environment from forest fires - Forest Eye - funded by EU IPA funds.</td>
<td>2015 - 2017</td>
</tr>
</tbody>
</table>
Table 2.22 Water Resource Management projects in the country

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Implementation Start/End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing Projects</td>
<td></td>
</tr>
<tr>
<td>ABD Programme for “Drina - Tara” region – funded by ABD grant scheme.</td>
<td>2013 - Ongoing</td>
</tr>
<tr>
<td>The West Balkans Drina River Basin Management (WBDRBM) Project – funded by Global Environment Facility (GEF) and Special Climate Change Fund.</td>
<td>2016 – October 2020</td>
</tr>
<tr>
<td>The Irrigation Development Project (IDP) – funded by Delegation of the EU to BiH.</td>
<td>2008 – Ongoing</td>
</tr>
<tr>
<td>Facilitation on the Drina River BASIN Nexus Assessment.</td>
<td>2016 – Ongoing</td>
</tr>
</tbody>
</table>

Table 2.23 Soil resource management in the country

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Implementation Start/End Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing Projects</td>
<td></td>
</tr>
<tr>
<td>Land Use/ Cover Area Frame Survey- LUCAS, JRC.</td>
<td>2015- Ongoing</td>
</tr>
<tr>
<td>Sustainable Forest and Landscape Management Project, WB.</td>
<td>2014 - 2019</td>
</tr>
</tbody>
</table>

B2.6 Evaluation of the main trends and gaps for natural resource management

Data collected in the first and second NFI are significantly different in BiH. As a country rich with forest resources it bears the potential for a stronger role in a renewable natural resource strategy. In order to mobilize forest resources it is necessary to have more accurate data meaning that is necessary to officially publish results of the second NFI. BiH is very rich in forest diversity and it is necessary to carefully include this aspect in forest management planning in order to satisfy the diversity of geography of BiH. Coppice forests with a significant share in private ownership should be specifically addressed in order to bring them back under forest management and define their potential role in not only biodiversity maintenance, but also biomass production. 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.

The level of complexity in forest management organizations does currently not support an adaptive forest management in rural areas. Private forest owners manage around 20% of the forests in BiH, but widely lack capacities and resources to properly manage their forests; additionally they are not organized into
private forest interest associations. Public forest enterprises are currently economically underperforming in the FBiH, but have a strong social role as employers. A higher profitability of public forestry could create additional assets for rural development. Forest infrastructure (i.e. forest roads) and harvesting technology are, however, insufficient to grant efficient forestry operations. Among forest damages, human-induced impact is the most prominent. Forest fires are of increasing abundance, and require specific fire management responses.

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 forests to understand what people want from forests, as well as the capacity of forest landscape to meet these demands. Combating illegal logging is one of the predominant objectives for rural development. This goes hand-in-hand with fighting corruption, better presence of controlling, and awareness-raising among the population.

The process of joining the EU is a significant driver of change in forest policy in BiH. The new EU Timber Regulation imposes indirectly 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 also 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.

Lack of knowledge in socio-political and economic aspects of natural resource management is a significant shortcoming of forestry professionals in BiH. The importance and changes of the role of forest sector in rural development is not adequately emphasized by current educational systems of forest sector in BiH.

In the case of the Federation of BiH Law on Forests from 2002, it was proclaimed as invalid by the constitutional court in 2009 and since that moment there is no Law on Forests at the level of FBiH.

The water infrastructure was severely damaged during the war (1992 - 1995), and even before the war the water supply systems suffered from a lack of investment and maintenance. So although it is estimated that 90% of the water-supply sector has been rehabilitated to its pre-war level, it still does not reach international standards. The quality of drinking water is, on the whole, mediocre and for nearly 50% of the population who do not have access to public water-supply systems the water quality is probably even more questionable (UNECE, 2011).

Despite the established institutional organisation and the legislation, high water losses are, unfortunately, one of the usual characteristics of many water supply systems (it is estimated that the water losses in water supply systems are up to 60%). Protected areas of the sources have not been established in a large number of cases. Even where they are established, the measures are usually implemented only in water protection zone I. The measures prescribed for water protection zones II and III, regarding the forest management and guidelines for agricultural production, are usually not implemented.

Discharges of untreated municipal waste water have had a major impact on the quality of surface water in most of BiH, and they are also potential threats to the quality of groundwater, which is the main source of drinking water. However, the most serious impact is on public health and the environment. Waste water from industrial plants containing organic and hazardous substances are, with very few exceptions, discharged into the nearest watercourse with little or no treatment (UNECE, 2011). This is also true for seepage water containing hazardous substances from mining and ore-processing. The negative impact on water quality is considerable, and there is no doubt that these discharges could represent a threat to public health and the environment. Moreover, this situation can be expected to get much worse when the industry recovers more from the devastating effects of the war, unless proper action is taken.

Flood protection installations have been poorly maintained, and dikes, channels and pumping stations
were damaged or destroyed during the war. Some large areas that are exposed to flooding do not have flood protection installations at all. However, extremely high water levels must be expected in the future. If there is no proper flood protection in place, they could cause many casualties and much material damage.

Currently, soil issues in BiH are not topical, and no extensive funding is allocated to address the issues of soil degradation. Regardless of this, the scientific community is independently doing research and develops certain approaches in individual projects, mainly donor funded. There is no integrated strategic approach to finding the solutions to soil degradation. While in regards to the AP the draft version was completed and the approval is ongoing in relation to the national strategy it is being prepared with the support of a donor project funded by FAO. The existing datasets are used as a base for defining indicators, which have been established for every category as requested by the UNCCD.

Further, BiH has a self-assessment of the national capacities in implementation of multilateral environmental agreements (NCSA, 2012), where needs for AP implementation are analysed.

In RS as well as in FBiH and in the Brcko District several important strategies and policy instruments in relation to soil have been developed. Although these strategic documents were adopted, a great deal remains to be accomplished in order to develop an efficient and effective system of compliance and enforcement. There is still an inadequate vertical coordination and communication between cantons/ municipalities and entities, but also an insufficient horizontal coordination at the inter-entity, inter-ministerial and inter-communal level is present. Also, a very significant problem is the shortage of staff and funding to carry out tasks and activities at all governmental levels. It is necessary to adopt common strategies which would be implemented in both entities to become a part of the future intense economic and rural development that is expected to take place during the preparatory period before accessing to the EU.

**B2.7 Conclusions (status quo, trends and gaps regarding all three natural resources)**

The results of this study have pointed out that it is necessary to support sustainable forest management planning and revise forest management planning in both public and private forests using new forest inventory data. Besides that, it will be necessary to establish new programmes for forest management planning in private forests and establish fire management concepts and systems: this includes means for both fire prevention (e.g. fuel management, awareness raising campaigns) and fire-fighting (logistics, machinery, international cooperation). When it comes to the NWFP it is necessary to support the establishment of regional horizontal and vertical marketing platforms of wood products and NWFP. Establishment of a web-based information platform on the forest, water and soil resources would significantly contribute to improvement of cross sectoral reporting and data availability. In order to motivate forest owners in BiH it is important to develop programmes for financial and institutional support of private forest owners associations (representation) and cooperatives (technical and marketing) and programmes for making forest certification accessible for forest owners.

In the case of biodiversity it is necessary 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 and develop concepts and examine hotspot areas for biodiversity and areas for stronger biomass production in coppice forests. In order to reduce negative impact of illegal logging it is necessary to support institutional mechanisms for combating illegal logging, and enforcement of a controlling and safeguarding system of illegal logging activities. Part of the strategic planning should be to foster institutional platforms for strategic forest policy making cross-entities support of implementation of a national forest programme and the establishment of cooperation mechanisms between educational institutions and enterprises. Implementation of integrated natural resource management could be improved if there were a will to foster institutional platforms for strategic forest, water and soil management across entities and finally it would be necessary to increase capacity building for EU standard implementation and information campaigns within the forest based sector.
The current institutional framework for water-related issues is decentralized, very fragmented and heterogeneous, both at the entity, and local levels. Generally, it can be concluded that in BiH a satisfactory legal framework in the field of water management has been developed that is based on the WFD. Related strategic documents were prepared with aims set in all areas of water management (water supply, waste water treatment, water quality, etc.). However, in the implementation of those legal acts many problems arose.

The scope of the water management sector, given the significance of this resource, to a certain extent overlaps with other activities and therefore it should be given a special priority. This arises from the functional nature of the water infrastructure facilities as well as the systems that depend on the issues associated with the locations and space necessary for their functionality and development. Therefore to be able to respond to the requirements of water management in terms of protected areas, sanitary protection zones of drinking water sources, etc. it is important to refer to those aspects during spatial planning. Intensifying the inter-sectoral cooperation is, as a measure, recognized by other sectors as well. For example, the Environment Protection Strategy stipulates the establishment of a permanent inter-ministerial cooperation body. This is because respective natural resource sectors all encounter the problem of insufficient cooperation and information sharing. Obviously, this is associated with insufficiently implemented requirements of good management practice. The scope of work of the water management sector is particularly susceptible to a lack of intensive inter-sectoral cooperation, since the integrated water resources management involves social, economic and environmental aspects, i.e. the cooperation with the sectors of environment, economy, agriculture, etc.

A lack of systematic soil monitoring and a lack of a soil/land informational system (SIS) in BiH are the main gaps regarding soil resources. Also, a deficiency of a unified inventory for land (separate registry and deed) combined with a lack of large-scale pedology maps and an adequate system of land assessment (land classification) has led to low levels of land use planning.

In BiH, rehabilitation and remedial measures defined by law and legislation is often not acted upon. Low levels of awareness regarding the significance of soil and land for sustainable development and survival of mankind is present in BiH.

Forests play both an integral role in the supply of clean water for a range of uses, and also in stabilizing and protecting soils from erosion. Much of the world’s freshwater is provided through forested catchments and forests protect many dams from siltation and contamination from various pollutants and protect groundwater systems from pollution. In addition, both soil and water are essential drivers of forest health and growth. However, with increasing demand for agricultural and urban land as a result of increasing population and more affluent life-styles, forests are often under pressure. In many regions this pressure will be exacerbated by climate change. Inter-sectoral cooperation between the three sub-sectors (soil, water, forest) and the other relevant sectors (agriculture, ecology, biodiversity...) is very weak without cooperation and synchronization. More stringent controls need to be introduced in the implementation of forest, soil and water systems rehabilitation measures by both public and private companies with environmental permits (zones around mines, industrial zones, etc.) and foresee sanctions in case of failing to fulfill this obligation after completion of exploitation.

The Ministries of entities and Brcko District almost never cooperate, which results in inadequate adoption of planning documents at the state level. For example, there is the Ministry of Agriculture, Water and Forestry in the FBiH and the RS. The fact is that very few sectors cooperate amongst themselves; there is no exchange of information and data, giving opinions to each other in making the planning documents (e.g. the adoption of Forest Management Plans and the adoption of water protection zones), although the law prescribes common work and exchange information. The cooperation at all levels of government, entities, communities, NGOs and land and forest owners should be developed in the spirit of partnership with a view to improve knowledge and sustainable use of nature and the values of land, i.e., scarcity of natural water resources in afflicted areas.

Since there is no a single database for implemented projects (within the MOFTER BiH) available to all,
it is important to create one in order to avoid double-funding of the same studies, particularly in case of donors’ funds.

From the aspect of natural resource management, in the implementation there are numerous problems in the area of coordination between water management and other natural resources. Despite well-established legislation in all three natural resources (forest, water and soil), there is no inter-sectoral cooperation, although the law prescribes it. Thus, it is necessary to improve inter-sectoral cooperation in order to improve integrated management of these natural resources.

**B2.8 Recommendations for integrated management/inter sectoral cooperation of the forest, water and soil resources in the country**

Research should be promoted to address forest, water and soil issues, and improve the knowledge base as regards these sectors. Particular attention should be paid on the identification of risk assessment methodologies and development of long-term land use change scenarios.

Aspects of sustainable use of forest, water resources and soil protection should be part of the agricultural and rural development policy. Emphasis should be placed on issues like reducing erosion, securing and improving vegetation cover, retaining and improving organic matter (no fires), etc. The agri-environment schemes should specifically support sustainable forestry and soil protection operations. This can always be combined with biodiversity protection.

It would be important to foster institutional platforms for strategic forest, water and soil management across entities to support the implementation of an integrated natural resource management. It is recommended to develop a joint investment strategy addressing cross-cutting issues of all three sectors (e.g. degradation of forest areas, soil erosion, and sedimentation of water infrastructures) at the entity level to develop recommendations for the state level. Recommendations for integrated management and intersectoral cooperation of the forest, water and soil resources refer to the institutional framework and natural resource monitoring, which set out to improve existing legal and institutional framework allowing the entities to:

- Harmonize legislation and integrate into sectoral regulations and policy;
- Improve access to information;
- Fulfil its reporting obligations (example: Development of Land Protection Strategy and SLM Strategy in RS and FBIH);
- Prepare a Law on Soil (protection, use and management), based on an integral environmental protection policy;
- Establish an entity level agency or institute that would be in charge of the implementation of Natural Resources management and protection policy;
- Develop long-term integral strategies for afflicted areas;

As well as to strengthen natural resources monitoring to:

- Raise public awareness and public participation on the importance of decision making following national legal requirements and international instruments related to natural resources;
- Introduce a system of remediation, recultivation in order to rehabilitate damaged land;
- Revitalize “industrial deserts” left behind mines and thermal power plants;
- Strengthen capacities for the implementation of natural resources management at the entity, cantonal and local levels;
- Strengthen synergies in implementation between the three Rio Conventions: the UNCBD, the UNFCCC and the UNCCD.
B2.9 Recommendations concerning follow-up activities for improved national resource management BiH

- Establish a comprehensive Soil Information System (SIS) in RS and FBIH and initiate the establishment of a Regional Centre to Combat Land Degradation;
- Link the scientific-research and other relevant institutions from the entity level down to the local community, through development of joint project proposals targeted at addressing the issue of soil degradation;
- Conduct research on the effects of fire on water, air, and soil resources of forest and rangeland watersheds and develop management options to restore or rehabilitate fire-damaged ecosystems;
- Develop a network of forest, soil and water researchers and research organizations;
- Conduct long-term, multiple-scale research on the on forests, soil and water resources in ecosystems;
- Integrate new forest, soil and water decision-support tools into current science-based management planning, prediction, and forecasting;
- Strengthening environmental education - planned, formal and informal education at different levels and in different sectors;
- Establishment and support of a national working group/discussion forum on coordination and cooperation on natural resource (forest, water, soil) management. Conduct workshops and webinars to educate users about new science and tools for water, air, and soil management;
- Awareness raising activities on the importance of improved natural resource management including the development of awareness-raising tools (leaflets, documentaries, TV spots) on the benefits to be gained from sustainable management and wise use of natural resources. Partner with educational specialists and organizations to develop or provide educational material (leaflets, documentaries, TV spots) for all educational levels and the public.
Reference list of the data used for the assessment

Agency for Statistics of BiH, official web site http://www.bhas.ba/


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Institute for Statistic of Republic of Srpska (2015). Statistical bulletin for Forestry, Number 15.,
Institute for statistic of RS (2016). Statistical bulletin for Forestry, Number 16.,


Ministry of Agriculture Water management and Forestry of the Federation of BiH (2015). Annual information on forest management and management plans in the Federation BiH.,


Official web site of Forest Stewardship Council: https://us.fsc.org/en-us


Official web site of the Republic Institute for Protection of cultural, historical and natural heritage Republic of Srpska.


USAID, FIRMA (2012). Utilization of low grade forest assortments and transformation of coppice forests in Bosnia and Herzegovina.


ANNEX B2.1
Supporting datasets

Figure 2.4 Administrative organization of BiH (Source: Agency for statistics BiH)

Figure 2.5 Distribution of forest types in BiH (Source FAO 2015)

Figure 2.6 Forest cover percentage (a), and private forest land ratios (b) in BiH (Source: Glück et al., 2010)
Figure 2.7 Water catchment area in BiH (Source: http://www.voders.org/index.php/slivovi)

Figure 2.8 Monitoring network of surface water quality in the Sava River Basin District in FBiH (Source: Sava River Watershed Agency)
Figure 2.9 Monitoring network of surface water quality in the Immediate Sava River Basin in RS (Source: http://www.voders.org/index.php/slivovi)

Figure 2.10 Monitoring network of surface water quality in the Sava River Basin District in BD (Source: HEIS)
Figure 2.11 Ecological status of surface water bodies in the Sava River Basin District in FBiH (Source: Sava River Watershed Agency)

Figure 2.12 Chemical status of surface water bodies in the Sava River Basin District in FBiH (Source: Sava River Watershed Agency)
Figure 2.13 Chemical status of surface water bodies in the Immediate Sava River Basin in RS (Source: Sava River Watershed Agency)

Figure 2.14 Ecological status of surface water bodies in the Immediate Sava River Basin in RS (Source: http://www.voders.org/index.php/slivovi/)
Figure 2.15 Soil map of BIH

Figure 2.16 The Map of Organic Carbon Content In Topsoils In Europe (Source: JRC)
Figure 2.17. Soil erosion map of Republic of Srpska (Source: Water agency of RS, Zoran Lazic)
CHAPTER B3
Overview of the Natural resource management in Kosovo*

Qazim Kukalaj\(^\text{12}\), Avdullah Nishori\(^\text{13}\)

B3.1 Introduction: General Information about Kosovo*

Kosovo* has a central geographical position in the Balkan Peninsula. It lies between 41°50’58” and 43°51’42” north geographical latitude and 20°01’30” and 21°48’02” east geographical longitude. Kosovo* has a total area of 10,908 km\(^2\), with 1,739,825 inhabitants (residents), but is one of the most densely populated countries, with an average density of 192 inhabitants per/km\(^2\) (Source: Agency for Statistics of Kosovo* - ASK). It is bordered by Albania (southwest), Macedonia (southeast), Serbia (east, north and northeast) and Montenegro (west). (Map 1).

Kosovo* is organized into 38 municipalities. It has implemented initial reforms to establish a fully functioning market economy, but the weak rule of law, large informal economy and an underdeveloped policy framework continue to hinder socio-economic growth. Growth reached 3.6% in 2015 and is estimated to remain at the same level in 2016. Kosovo* remains one of the poorest countries in Europe, with a per-capita gross domestic product (GDP) of about € 3,196, with about 30% of the population living below the national poverty line and roughly one-eighth living in extreme poverty. Despite the considerable progress that has been made in recent years as a result of the many initiatives and improvements, damages and degradation of natural resources (forests, agriculture and forest land, water resources, flora and fauna) continues. At the same time Kosovo* is in a process of signing several international agreements in relation to forests, water and environmental protection, which will have an influence on the sustainable natural resources management.

Water resources are a very important resource for the economic development and public health for every country. Kosovo* has insufficient water resources, and in the future, it will be a limiting factor for its

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\(^{12}\) AFA Consulting Company National Resource Solution, Kosovo*

\(^{13}\) Regional Environmental Centre REC, Kosovo*
economic and social development. It is estimated that Kosovo* has only 1,600 m³/water/year per capita. Water resources in Kosovo* are relying predominantly on precipitation. In Kosovo*, the human health and meeting the associated needs is increasingly threatened by the poor quality of potable water or the lack of clean potable water. Industrial development, urbanization, and intensive agriculture are merely a few of the factors that affect and have led to water pollution. In spite of continued efforts, the uncontrolled use of resources and damaging the riverbeds remains one of the most expansive forms of water resources degradation.

B3.2 Assessment of the Forest sector

B3.2.1 Forest resources and management

During the years 2012/2013 an inventory of Kosovo**s forests was completed. General data as a result of this process can be summarized as follows: Kosovo**s forests cover 481,000 ha or around 44% of total area (see Table 3.1). Comprising 44% of Kosovo**s total territory and influencing its climatic and geologic conditions forests could contribute to national GDP in the future at a level of between 4% - 8% compared to its current contribution of 2.5% - 3.5%. According to the current national forestry inventory, 40% of the public forests and 29% of the private forests in Kosovo* are subject to uncontrolled or illegal harvesting activities. Large volumes of forest residues very often remains in the forest after the harvesting, which is resulting in loss of fiber, damages from insect attacks and increased risk of forest fires. Forest and forest land areas are calculated to be around 0.28 hectares per capita which is below the average of Europe. Areas of bare forests land are calculated to be from 20,000 to 30,000 ha. Forest structure is dominated by deciduous forests within participation of about 93%, mainly dominated by beech and oak forests. More than half of the forests are considered even-aged forests. Conifer forests cover about 7% of the total area and are mainly dominated by silver fir (Abies alba), and about 3% include all other types of deciduous coniferous species (common spruce, pine forests and other fast growing coniferous forests). The forest inventory shows that the total standing wood volume is 40.51 million of m³, from which the volume of high forests is 21.01 million m³ while the volume of low forests is 19.5 million m³.

Forest area by management and protection regime

Table 3.1 Size of the forest area by management (economic, non-economic) and protection regime (Source: Kosovo* National Forest Inventory 2012, Pristina (Modified Table).

<table>
<thead>
<tr>
<th>Vegetation form</th>
<th>Available surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic Forests</td>
<td>Non-Economic Forests</td>
</tr>
<tr>
<td></td>
<td>ha</td>
<td>ha</td>
</tr>
<tr>
<td>1. High forest</td>
<td>23,600</td>
<td>n.a</td>
</tr>
<tr>
<td>2. Coppice forest</td>
<td>396,000</td>
<td>n.a</td>
</tr>
<tr>
<td>3. Mixed forest</td>
<td>1,800</td>
<td>n.a</td>
</tr>
<tr>
<td>All forests (1+2+3)</td>
<td>421,400</td>
<td>59,600</td>
</tr>
<tr>
<td>4. Shrubbery</td>
<td>7,000</td>
<td></td>
</tr>
<tr>
<td>5. Barren</td>
<td>21,540</td>
<td></td>
</tr>
<tr>
<td>4+5 Shrubbery and barren</td>
<td>28,540</td>
<td></td>
</tr>
<tr>
<td>5. Other forest areas</td>
<td>42,003</td>
<td></td>
</tr>
<tr>
<td>FAO forest (1+2+3+4+5)</td>
<td>463,403</td>
<td>28,540</td>
</tr>
<tr>
<td>All forest and forest land</td>
<td>463,403</td>
<td>28,540</td>
</tr>
</tbody>
</table>
In Kosovo* within a relatively short time period two forest inventories (in 2002/03 and in 2012/13) were conducted. These two did not however provide a classification of forests by management and protection regime. That means that no forest classification by purpose and functions is currently available.

**Growing stock, increment and felling and carbon stock**

As can be seen in Table 3.2 the annual forest harvesting is very low in total, especially in public forests. The legal harvest covers around 14% of the annual population demand for firewood in Kosovo*, leaving a large market for illegal logging. Around 95% of the wood consumed is firewood, wood for cooking and other family needs.

<table>
<thead>
<tr>
<th>Forest types</th>
<th>Publicly Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 m³</td>
<td>m³/ha</td>
<td>000 m³</td>
</tr>
<tr>
<td><strong>Growing Stock</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>8,731.1</td>
<td>174.2</td>
<td>2,188.8</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>17,910.0</td>
<td>75.0</td>
<td>11,315.2</td>
</tr>
<tr>
<td>Total</td>
<td>26,641.1</td>
<td>13,504.0</td>
<td>40,145.1</td>
</tr>
<tr>
<td><strong>Total annual volume increment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>190.34</td>
<td>3.1</td>
<td>54.72</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>764.16</td>
<td>3.2</td>
<td>615.68</td>
</tr>
<tr>
<td>Total</td>
<td>954.5</td>
<td>670.44</td>
<td>1,624.90</td>
</tr>
<tr>
<td><strong>Average annual felling</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>1.033</td>
<td>29.15</td>
<td>n.a</td>
</tr>
<tr>
<td>Total</td>
<td>29.672</td>
<td>169.715</td>
<td>199.388</td>
</tr>
<tr>
<td><strong>Carbon stock (t CO2)</strong></td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The carbon balance in the forestry, tCO₂ equivalent, was estimated during the study of Climate Protection Strategy in the Forest Sector in Kosovo* in 2012. The baseline (2003) estimation (cautions estimate) was -645,000 tCO₂ eqv and the trend from 2003 to 2012 is (minus) -1,049,000 to (minus) -1,140,000 tCO₂. The negative values mean that there are net emissions from forests. In other words, the forests are not a carbon sink. The National Forest Inventory (NFI (2013) estimated that the carbon sink (above and underground) is 88,717 tCO₂ eq.

**Forest types and ownership by management regime**

Kosovo* plateau is completely covered by low canopy deciduous forests. High deciduous forests are mainly distributed in the mountainous and partly hilly areas, while coniferous forests cover mountainous regions of larger massifs (Bjeshkët e Nemuna/Prokletije, Shara Mountains and Mokra Gora). Deciduous forests are composed mainly of oak and beech tree species while coniferous forests are composed of silver fir, common spruce, white bark pine, Balkan pine and black pine. (See map in Annex).
As is presented in Table 3.4, 61.3% of all forests are publicly owned and 38.7% are privately owned. In Kosovo* there is no forest category of communal forests. The largest amount of publicly and privately owned forests are coppice forests (44.4% and 35% respectively). High forests comprise a much smaller share of the total forest area (12.3% and 0.7% respectively).

Table 3.3 Ownership types by forest categories (Source: Kosovo* National Forest Inventory 2012, Pristine, 2013 (data calculated and modified)).

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High coniferous forest (common silver fir, European spruce, white bark pine, Balkan pine and black pine).</td>
<td>6.3%</td>
<td>0.7%</td>
<td>7.0%</td>
</tr>
<tr>
<td>2. High broadleaved forest and mixed coniferous and broadleaved forests (beech forest, oak forest, and beach, fir and spruce forest).</td>
<td>6.0%</td>
<td>2.0%</td>
<td>8.0%</td>
</tr>
<tr>
<td>3. Coppice broadleaved forest (oak, beech, and other broadleaved forests).</td>
<td>44.5%</td>
<td>35.0%</td>
<td>79.5%</td>
</tr>
<tr>
<td>4) Mixed forest (Coppice and high forest of oak, beech and birch.</td>
<td>1.4%</td>
<td>0.12%</td>
<td>1.52%</td>
</tr>
<tr>
<td>5) Degraded broadleaved forests.</td>
<td>3.2%</td>
<td>0.80%</td>
<td>4.0%</td>
</tr>
<tr>
<td>Total</td>
<td>61.4%</td>
<td>38.6%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 3.4 Ownership types by forest categories (Source: Kosovo* National Forest Inventory 2012, Pristine, 2013 (data calculated and modified)).

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
</tr>
</thead>
<tbody>
<tr>
<td>High forests</td>
<td>59,400.0</td>
<td>12.3%</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>214,045.0</td>
<td>44.4%</td>
</tr>
<tr>
<td>Mixed</td>
<td>6,734.0</td>
<td>1.4%</td>
</tr>
<tr>
<td>Degraded forests</td>
<td>15,392.0</td>
<td>3.2%</td>
</tr>
<tr>
<td>Total</td>
<td>295,571.0</td>
<td>61.3%</td>
</tr>
</tbody>
</table>

The reform of the public forestry sector has been going on since the year 2000. UNMIK within Kosovo* institutions has promulgated a series of administrative directions and regulations, which have been systematically transferring the competencies of forestry Socially Owned Enterprises (SOE) to the new Kosovo* Forest Agency. The new Law on Kosovo* Forests of 2003 further confirmed the new system for administering public forests. The SOE consider that they have lost a lot after the emergence of KFA, which in practice took away practically all of their previous competencies. The SOE have not only lost their forest possessions but also the right to freely operate in the public forests. (Strategy Draft Report - Reform of the Socially Owned Forestry Enterprises in Kosovo*). Rural communities are an integrated part of the municipalities and are located physically closest to the forests. The unfavourable situation is exacerbated by the fact that most households are heated by wood and that the price of firewood is very high (25 to 40 euros/m³ stacked volume) for local income standards.
B3.2.2 Forests in support of rural communities

Public forests and public forest companies

According to the Kosovo* Law on Forest, there are regulated procedures of wood harvesting and wood transport. Also the forestry legislation prescribes rules for issuing licenses to harvest, marking of trees to be cut, procedures for sales of wood and restrictions in moving and transporting wood products. Using this legal right and opportunity, forest operation activities such as logging of firewood or technical wood, transport, afforestation, reforestation, wood processing and other forest operation activities can only be carried out by registered private forest and wood processing companies and other groups or individuals engaged in commercial forestry activities. That means that in Kosovo* there are no public logging companies nor are there public wood processing companies.

Status of private forest owners and forest owner associations

The percentage of private forest in Kosovo* is around 40% of the total forestlands owned by approximately 40,000 private forest owners. The average size of each private forest property is 1.5 ha, fragmented into 2.4 parcels. Given this very fragmented structure of ownership the possibilities for efficient land management is seriously limited. In previous years private forest owners and rural communities were expected to organise themselves. In many Municipalities they formed their own local family forest owner associations. As a result, there are currently 18 local associations united under one umbrella association at a national level in Kosovo*, called NAPFO (National Association of Private Forest Owners). The total membership is 4,300 members. The reported cumulative forest area of member associations is 53,500 hectares. Incomes and revenues from forestry has not been recorded or reported. In order to improve the operations and the functionality of the associations, a mid-term and long-term strategy for the National Association of Private Forest Owners of Kosovo* was prepared and is being reviewed for approval.

Forest land ownership structure

The major number of staff responsible for public forest and forest land management, as well as for controlling and monitoring public and private forest management is the responsibility of the government bodies (KFA & DoF). As it is presented in the Table 3.7, the number of technical staff (forestry engineers and forestry technicians) is very limited. The situation is also alarming in municipal levels in which there are almost no forestry experts with higher education. It should be emphasised that the existing number of professional and technical staff within forestry who have not attended regular training courses exists in part due to the lack of a training centre in Kosovo*. Lack of knowledge and working experience of employees engaged in the forestry and wood processing operations is also significant, including managerial staff of companies dealing with logging and wood processing. This situation is seriously affecting the performance of the forestry and wood processing sectors. The total number of people employed in the forestry sector at the Central Government and municipalities in 2016, amounted to 341 (see Table 3.5), while according to the produced document, “Kosovo* Forest Sector Study 2013” completed by SIPU International AB, the number of employees in wood production is calculated to be around 10,000; in wood processing 14,000; in non-wood forest products 5,000; and in other areas 1,500. In total 20,500 employees. Data regarding the total number of 20,500 employees does not comply with the statistical data, presented in Table 3.6. The number of 10,000 employees involved in wood production is calculated based on the registered and unregistered (illegal) annual tree harvesting.

<table>
<thead>
<tr>
<th>Qualified and highly qualified workers</th>
<th>Forestry engineers</th>
<th>Forestry technicians</th>
<th>Administrative and other workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>38</td>
<td>41</td>
<td>39</td>
<td>152</td>
</tr>
<tr>
<td>Forest guards</td>
<td></td>
<td></td>
<td></td>
<td>189</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>341</td>
</tr>
</tbody>
</table>

Table 3.5 People employed in the forest sector by education (KFA –DoF and Municipalities) (Source: Kosovo* Forest Agency (Modified), 2016.)
Employment in the wood based sector

The wood-processing sector in Kosovo* has largely based its production on both domestic and imported raw materials and semi-finished products. Wood based industry comprises some 1,400 firms out of which around 120 are classified as medium-large and whose main activity is the production of sawn wood, windows, doors, furniture, etc. The total number of employees as it above mentioned is around 14,000. As is it presented in the following table (Table 3.6), the largest number of workers is engaged in the manufacture of the furniture. Similar to the forestry sector, the wood-based sector also lacks competent and trained staff. For approximately 70% of employees, secondary education is their highest level of educational attainment. While 11% of employees are reported to have completed tertiary education, the respondents of the survey claimed that only 1% of their employees have completed professional education, while 14% have completed primary education.

Table 3.6 Number of employees in forest-based industries (Source: Kosovo* Agency of Statistics (KAS), Prishtina 2016.)

<table>
<thead>
<tr>
<th>NACE Rev2 Division</th>
<th>Description (NACE Rev2)</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Forestry and logging</td>
<td>92</td>
<td>48</td>
<td>45</td>
<td>24</td>
<td>68</td>
</tr>
<tr>
<td>16</td>
<td>Manufacture of wood and products of wood and cork.</td>
<td>803</td>
<td>849</td>
<td>916</td>
<td>987</td>
<td>1,178</td>
</tr>
<tr>
<td>17</td>
<td>Manufacture of paper and paper products</td>
<td>134</td>
<td>157</td>
<td>211</td>
<td>250</td>
<td>300</td>
</tr>
<tr>
<td>31</td>
<td>Manufacture of furniture</td>
<td>1,264</td>
<td>1,428</td>
<td>1,516</td>
<td>1,559</td>
<td>1,747</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td>2,293</td>
<td>2,482</td>
<td>2,688</td>
<td>2,820</td>
<td>3,293</td>
</tr>
</tbody>
</table>

B3.2.3 Fostering competitiveness of the forest sector and added-value chains

Income structure and revenues of state forest companies

Analysing the quantity and structure of revenues realised in the forestry sector shows that the main revenues have come from rent of forest land, followed by revenues from the sale of standing trees (stumpage tree value) and fee collection for technical and extension services provided to private forest owners. Revenues from the sale of standing trees are far below the optimum, as a result of the very limited amount of wood mass legally harvested in the public forests, (See Table 3.7). Results derived from various studies and projects in Kosovo* shown the amount of unregistered harvested wood mass is much higher than the wood mass legally harvested. In spite of significant increases in the past years, government revenues from forestry activities implemented by the KFA still remain below expenditures as it shown in the table presented below.

Table 3.7 Income structure and revenue of (Kosovo* Forest Agency) and Forestry Department (Source: Kosovo* Forest Agency (Data modified), 2016, Prishtina.)

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Revenues</strong></td>
<td>1,222,037.00</td>
<td>1,239,319.00</td>
<td>1,534,173.00</td>
</tr>
<tr>
<td>Revenues from wood sales (Standing tree value)</td>
<td>219,022.00</td>
<td>344,224.00</td>
<td>415,210.00</td>
</tr>
<tr>
<td>Fees for professional services in the private forests</td>
<td>334,199.00</td>
<td>280,470.00</td>
<td>317,219.00</td>
</tr>
<tr>
<td>Other administrative fees and services</td>
<td>n.a</td>
<td>29,421.00</td>
<td>32,333.00</td>
</tr>
</tbody>
</table>
## Public and international funding and investments

In April 2012, the Government of Kosovo* adopted a mid-term (3 year) budget expenditure framework covering 2013 - 2015, detailed by agencies and sectors. The priorities for the period 2013 - 2015 were sustainable economic, social, and institutional development. As stated in the Kosovo* Government Expenditure Framework, in order to fulfil its mission in the mid-term period, MAFRD plans to achieve 5 objectives, among which is the revitalisation of the forest sector. In that function the Government of Kosovo* has allocated 900,000.00 euros per year for forests, from which 350,000.00 euros regarding afforestation of forest areas, and 550,000.00 euros for the development of management plans. For the year 2015 however the amount was reduced to 700,000.00 euros. As it is presented in the table below (Table 3.8) the average public investment of the forestry sector for the period 2013 - 2015 was 942,443.62 euros. The largest international funding countries and organisations in the Kosovo* forestry sector were: Finland, Sweden, Norway, FAO, EU - Twining, CNVP of Nederland, EU – countries, GIZ, USA, and other countries. The forestry sector received international support during the period 2010 - 2015 to the amount of 9,799,778 euros.

### Table 3.8 Public and international investments/funding (Source: MAFRD/FAO Forest sector progress report 2014/2015.)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting infrastructure*</td>
<td>KPEP CNVP EUT</td>
<td>40,313</td>
<td>87,240</td>
<td>219,493</td>
<td>200,000</td>
<td>30,000</td>
<td>20,000</td>
<td>597,046</td>
</tr>
<tr>
<td>Afforestation of barren lands</td>
<td>FAO FIN</td>
<td>41,126</td>
<td>86,500</td>
<td>219,493</td>
<td>200,000</td>
<td>30,000</td>
<td>20,000</td>
<td>597,046</td>
</tr>
<tr>
<td>Drafting of Management Plans</td>
<td>FAO EU Twining</td>
<td>582,614</td>
<td>217,850</td>
<td>72,357</td>
<td>557,000</td>
<td>93,866</td>
<td>103,015</td>
<td>1,626,702</td>
</tr>
<tr>
<td>Purchase of field vehicles</td>
<td>FAO FIN</td>
<td>30,000</td>
<td>150,000</td>
<td>50,000</td>
<td>20,000</td>
<td>250,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-commercial thinning KFA - SIDA</td>
<td>FAO FIN</td>
<td>2,500</td>
<td>2,000</td>
<td>414,000</td>
<td>40,000</td>
<td>455,000</td>
<td>1,000,125</td>
<td>1,913,625</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>474,977</td>
<td>175,814</td>
<td>344,583</td>
<td>350,000</td>
<td>84,000</td>
<td>30,000</td>
<td>1,344,745</td>
</tr>
</tbody>
</table>

### Public funding in euros (€)

<table>
<thead>
<tr>
<th>Years</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2010-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting infrastructure*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afforestation of barren lands</td>
<td>550,000</td>
<td>450,000.00</td>
<td>450,000.00</td>
<td>1,450,000.00</td>
</tr>
<tr>
<td>Drafting of Management Plans</td>
<td>300,000</td>
<td>250,000.00</td>
<td>250,000.00</td>
<td>800,000.00</td>
</tr>
<tr>
<td>Purchase of field vehicles</td>
<td>50,000</td>
<td>200,000.00</td>
<td>250,000.00</td>
<td></td>
</tr>
<tr>
<td>Pre-commercial thinning KFA - SIDA</td>
<td></td>
<td></td>
<td>327,330.86</td>
<td>327,330.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>900,000.00</td>
<td>700,000.00</td>
<td>1,227,330.86</td>
<td>2,827,330.86</td>
</tr>
</tbody>
</table>

### International funding (in forestry projects)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Development</td>
<td>FAQ FIN KPEP CNVP EUT</td>
<td>40,313</td>
<td>87,240</td>
<td>219,493</td>
<td>200,000</td>
<td>30,000</td>
<td>20,000</td>
<td>597,046</td>
</tr>
<tr>
<td>Plantation Management</td>
<td>FAQ FIN EU Twining</td>
<td>582,614</td>
<td>217,850</td>
<td>72,357</td>
<td>557,000</td>
<td>93,866</td>
<td>103,015</td>
<td>1,626,702</td>
</tr>
<tr>
<td>Monitoring for forest health</td>
<td>FAO FIN</td>
<td>30,000</td>
<td>150,000</td>
<td>50,000</td>
<td>20,000</td>
<td>250,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tending for young forest</td>
<td>FAO FIN CNVP SIDA</td>
<td>2,500</td>
<td>2,000</td>
<td>414,000</td>
<td>40,000</td>
<td>455,000</td>
<td>1,000,125</td>
<td>1,913,625</td>
</tr>
</tbody>
</table>
### Natural Resource Management in Southeast Europe: Forest, Soil and Water

#### Table 1: Embodied costs of the natural resource management in Southeast Europe (EUR)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Cost 1</th>
<th>Cost 2</th>
<th>Cost 3</th>
<th>Cost 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest vocational education</td>
<td>29,350</td>
<td>1,150</td>
<td>30,500</td>
<td></td>
</tr>
<tr>
<td>Forest vocational training</td>
<td>37,819</td>
<td>22,125</td>
<td>59,944</td>
<td></td>
</tr>
<tr>
<td>Higher forest education</td>
<td>33,130</td>
<td>48,799</td>
<td>117,498</td>
<td></td>
</tr>
<tr>
<td>Awareness raising</td>
<td>7,099</td>
<td>49,425</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>Capacity Development</td>
<td>36,500</td>
<td>17,965</td>
<td>68,685</td>
<td></td>
</tr>
<tr>
<td>Biodiversity action plans</td>
<td>5,240</td>
<td>60,975</td>
<td>101,865</td>
<td></td>
</tr>
<tr>
<td>Drafting of legislation</td>
<td>3,000</td>
<td>1,500</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td>Forest non-wood product</td>
<td>14,720</td>
<td>111,245</td>
<td>471,310</td>
<td></td>
</tr>
<tr>
<td>Support to forest owner assoc.</td>
<td>31,885</td>
<td>97,430</td>
<td>200,490</td>
<td></td>
</tr>
<tr>
<td>Training in entrepreneurship</td>
<td>23,830</td>
<td>34,435</td>
<td>582,65</td>
<td></td>
</tr>
<tr>
<td>Bio energy Production</td>
<td>10,674</td>
<td>34,490</td>
<td>120,934</td>
<td></td>
</tr>
<tr>
<td>Forest inventories</td>
<td>325,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest management planning</td>
<td>677,008</td>
<td>569,216</td>
<td>2,333,776</td>
<td></td>
</tr>
<tr>
<td>Operational planning</td>
<td>2,000</td>
<td>2,000</td>
<td>5,000</td>
<td></td>
</tr>
<tr>
<td>Reduced unlawful harvesting</td>
<td>42,739</td>
<td>41,983</td>
<td>84,722</td>
<td></td>
</tr>
<tr>
<td>Improved harvesting practices</td>
<td>22,350</td>
<td>22,100</td>
<td>44,450</td>
<td></td>
</tr>
<tr>
<td>Implementation of Action Plan</td>
<td>17,840</td>
<td>83,500</td>
<td>285,600</td>
<td></td>
</tr>
<tr>
<td>Institutional and technical support</td>
<td>54,108</td>
<td>216,922</td>
<td>815,077</td>
<td></td>
</tr>
<tr>
<td>TOTAL:</td>
<td>1,551,370</td>
<td>1,755,889</td>
<td>9,799,778</td>
<td></td>
</tr>
</tbody>
</table>

#### Forest products and services

Non-Wood Forest Products (NWFP) are part of a larger sub-sector (horticulture). The share of NWFP of the Agribusiness sector is currently estimated at less than 10%. The total market euro value of NWFP products is estimated at close to 10 million euros per annum, giving a large added value in semi-processing and collection and aggregation services. It is reported that there are 13 different companies active in this sub-sector in Kosovo*, with an annual turnover between 50,000 to 2,500,000 euros. Most of the companies in fact sell under 100 tons per year, while only a few leading companies are trading over 200 tons of mushrooms and other NWFP products per year realizing an annual turnover of over 1,000,000.00 euros each.

#### Contribution of the forest sector to GDP

There are currently no official data on the value added of the forestry sector in Kosovo*. However, it is estimated that 4 - 8% of the GDP could be achieved by the forestry sector in the future given favourable conditions. In 2009 it was estimated that the forestry sector as a percentage of the GDP is approximately 2.5% - 3.5% (REC, 2009). It is assumed that forestry activities could generate value added of 20 to 40 million EUR per year.

#### Trade balance

As indicated in Table 3.9, import is much higher than the export for all wood products. Neither data as regards the quantity, nor the monetary value of imported and exported wood products (lumbers) nor other...
wood products, due to the classification of all wood assortments including charcoal are available. In some cases, it was difficult to decipher customs data, because forest products were expressed in different measurement units such as tons, kilos, stacked volume, solid volume and other units. Regarding firewood quantity and value some studies shown that annual import of primary wood products (lumbers) in Kosovo* is about 221,782 m³ and only about 2,937 m³ of firewood have been registered. Table 3.9 also shows clearly that the import of wood and wood products steadily increased during the period 2013 - 2015.

Table 3.9 Sales and turnover value of wood and wood products (Source: Statistic Agency of Kosovo*, Pristine 2016.)

<table>
<thead>
<tr>
<th>Year</th>
<th>Commodity/ Indicators</th>
<th>Import</th>
<th>Export</th>
<th>Import</th>
<th>Export</th>
<th>Import</th>
<th>Export</th>
<th>Import</th>
<th>Export</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Kg</td>
<td>€</td>
<td>Kg</td>
<td>€</td>
<td>Kg</td>
<td>€</td>
<td>Kg</td>
<td>€</td>
</tr>
<tr>
<td>2013</td>
<td>CHAPTER 44 - Wood and article of wood, wood charcoal.</td>
<td>183,193,180.5</td>
<td>52,608,138.9</td>
<td>3,289,977.6</td>
<td>2,133,524.7</td>
<td>196,732,086.1</td>
<td>54,930,268.8</td>
<td>9,159,880.1</td>
<td>2,179,129.9</td>
</tr>
<tr>
<td>2014</td>
<td>CHAPTER 47- Pulp of wood or of other fibrous cellulosic material recovered (waste and scrap) paper or paperboard.</td>
<td>237,973.4</td>
<td>9,608,620.01</td>
<td>68,599.1</td>
<td>80,610.7</td>
<td>14,400,315.0</td>
<td>1,500,567.0</td>
<td>2,492,457.0</td>
<td>1,51,869.1</td>
</tr>
<tr>
<td>2015</td>
<td>CHAPTER 48 - Paper and paper board. Articles of paper pulp, of paper or of paperboard.</td>
<td>29,827,701.8</td>
<td>68,599.1</td>
<td>80,610.7</td>
<td>14,400,315.0</td>
<td>1,500,567.0</td>
<td>2,492,457.0</td>
<td>1,51,869.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>94: CHAPTER 94 - Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated nameplates and the like; prefabricated buildings.</td>
<td>21,940,087.3</td>
<td>46,221,400.6</td>
<td>1,008,425.9</td>
<td>1,911,860.9</td>
<td>2,179,129.9</td>
<td>1,500,567.0</td>
<td>2,492,457.0</td>
<td>1,51,869.1</td>
</tr>
<tr>
<td>TOTAL:</td>
<td></td>
<td>233,388,941.7</td>
<td>131,372,403.7</td>
<td>23,739,197.4</td>
<td>6,586,798.7</td>
<td>226,844,146.0</td>
<td>5,696,196.0</td>
<td>26,086,104.9</td>
<td>8,012,196.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,219,008.7</td>
<td>40,352,916.4</td>
<td>1,558,077.6</td>
<td>1,558,077.6</td>
<td>1,558,077.6</td>
<td>1,558,077.6</td>
<td>1,558,077.6</td>
<td>1,558,077.6</td>
</tr>
</tbody>
</table>

Illegal Logging

Based on Forest Inventory conducted in 2003 and 2012, only 70,000 m³ was harvested each year according to Kosovo* regulations, while over 90% of the annual cutting is not carried out according to regulations (Kosovo* Forest Inventory, 2012/2013). The same document states that illegally logging is identified as a problem in 40% of the public forest land and 29% of private forestlands. Forest damage is caused mainly by biotic (human) factor, through illegal activities. The population continues to find illegal ways to securing sources for heating and financial sources by trading wood. Forestry land at lower altitudes is attractive for illegal logging due to lower cost and easier access. There are two main factors for illegal logging:

- The illegal harvesting of forest firewood for personal profits/needs from private and public forest,
and:
- The illegal harvesting from public forestlands for organised crime.

The main types of illegally logging in the Kosovo*
- Logging without permission from public forests.
- Logging in protected areas, such as national parks.
- False declaration regarding the origin of the wood.
- False declaration regarding the volume of harvested wood.
- Illegal logging in private forests, etc. (REC-Illegal logging activities in Kosovo* (under UNSCR 1244/1999), Prishtina, 2009.

MAFRD supported by donor organisations has drafted a “National Forest Health Programme 2016 - 2025”. A national action plan against illegal logging was prepared and approved in 2012. Full-scale implementation is pending. Serious, violent forest crime cases have also been reported (MAFRD - Forest Sector Progress Report 2014 - 2015).

B3.2.4 Protection forests and enhancing ecosystem services

Forest health and damages

The National Forest Health Programme 2016 - 2025 was finalised in 2015. The programme was supported by the FAO including organising of training sessions on good practices for forest health protection and implementation of international phytosanitary standards in forestry.

The Kosovo* Forest Inventory also provides data in regard to the main causes of forest health damage, and concluded that 13.1% of coniferous trees (784,000 m³) and 14.7% (5,058,000 m³) of broadleaved trees were classified as having damage (see Table 3.2). In total, 14.5% of the growing stock was affected by damages, while 85.57% of growing stock (34,665 mill. m³) was not affected. Considering the large area of uneven aged forest, some level of suppression is expected. It is likely that a significant proportion of the damaged trees will eventually recover their vitality.

![Figure 3.2 Forest growing stock damages and cause of damage (in 1,000 m³)](Source: Kosovo* Forest Inventory, 2012/2013)

Biodiversity conservation and management

Kosovo* is rich in different plant species, considering the country’s relatively small size. Results of data gathering and conducted studies have shown that 13 species of plants grow only in Kosovo* and approximately 200 species also grown across the Balkans. This diversity is a result of complex physical factors, including soil type and climate that create diversity of habitats and conditions for growth of plants. In Kosovo* around 24 species of plants are threatened as a result of human activities. Favourable conditions for plant species in Kosovo* indicate a high level of diversity of animals within this relatively small territory. Approximately 46 species of mammals live in Kosovo*, most them with regional and global importance. Some species of water birds were lost because of wetland destruction, pollution and degrading of rivers. The process of determining the network NATURA 2000 areas in Kosovo* has not started yet, however a legal framework replete with policies, which support the creation of such areas, has been created. Kosovo* has two National Parks promulgated by the Assembly of Kosovo*: N.P. “Shari” within an area of 53,469 hectares, and the National Park “Bjeshket e Nemuna”/ Prokletije, 62,488 hectares in area. Adopted
national parks guidelines are not satisfactory because the guidelines focus primarily on nature focused management and closely regulated parks. The reality in Kosovo* is somewhat different, as the park must combine elements of biodiversity conservation, cultural heritage, natural resource use, livelihood support, mass tourism and informal recreation in the context of a framework of collaborative management. The existence of the private property within national parks and non-possibilities for compensation for the restrictions implied to the private owners is another big challenge. The system of governance for the parks is still unclear. Existing Park Administration faces difficulties related to the limited number and competences of the staff. Table 3.10 provides some information about protected areas in Kosovo*.

Table 3.10 Protected area according to the IUCN (Source: State of Nature Report 2010-2014, MESP.)

<table>
<thead>
<tr>
<th>IUCN Category</th>
<th>Name</th>
<th>No.</th>
<th>Surface ha</th>
<th>Participation of PA%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Nature Reserves</td>
<td>11</td>
<td>847</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>NR. Vegetative</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NR. Animal</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NR. Hydrologic</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NR. Geologic</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>National Parks</td>
<td>2</td>
<td>115,957</td>
<td>10.6</td>
</tr>
<tr>
<td>III</td>
<td>Nature Monuments</td>
<td>99</td>
<td>5,972</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>NM. Speleological</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NM. Hydrologic</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NM. Geomorphologic</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NM. Botanic</td>
<td>66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Nature Regional Park</td>
<td>1</td>
<td>1,126</td>
<td>0.100</td>
</tr>
<tr>
<td>V</td>
<td>Protected Landscape</td>
<td>2</td>
<td>85</td>
<td>0.007</td>
</tr>
<tr>
<td>V</td>
<td>Special Protected Areas of Birds</td>
<td>1</td>
<td>109</td>
<td>0.009</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>116</td>
<td>118,913.95</td>
<td>10.90%</td>
</tr>
</tbody>
</table>

**Forest certification in Kosovo***

Kosovo* has had its national FSC standards since 2012, which were developed based on the support of USAID. Two state forest management units were identified for certification, but until now Kosovo*’s forests were not certified. Kosovo* is looking for donor support implementation, and has already prepared standards to certify the two first identified forest management units.

B3.2.5 Institutional set-up of the forest sector, legal and policy governance

**Organization of the forestry sector**

Forestry in Kosovo* is controlled by the Ministry of Agriculture, Forestry and Rural Development (MAFRD) with two branches: Department of Forestry (DoF), as the regulatory body, and the Kosovo* Forest Agency (KFA), the body in charge of administration and management of public forests and forest land, monitoring and controlling the management of private forests. KFA is also responsible for law enforcement. Kosovo* municipalities are responsible for forestry protection on the municipal territory within the authority delegated by the central authority, including the granting of licenses for the felling of trees on the basis of rules adopted by the Government. The Ministry of Environment and Spatial Planning (MESP) is in charge of creating and implementing general management legislation in the field of environment, water, housing, spatial planning and construction. The MESP also has competences over national parks, covering around 25% of the total forest area in Kosovo*.
Legal framework for forest policy

The main forestry legal acts are Law No. 2003/3 on Forests in Kosovo*, Law No. 2004/29, an Amendment to Law No. 2003/3 on the Law on Forests of Kosovo*, and Law No.03/L-153 on Amending and Supplementing the Law No. 2003/3 on Kosovo* Forests and numerous administrative instructions. It is worth mentioning the requirement of the law to manage forests in compliance with statement on principles for global consensus on management, conservation and sustainable development of all forests.

The main forestry laws are:
- Law on Kosovo*’s Forests, 2003/3;
- Amendment of Law on Forests, 2004/29;
- Amendment of Law on Forests 2005/49;
- Law on Hunting 2005/02- L – 53;
- Law on seedling material 2004/13;
- Law on protection from fire 02/L - 41 06.04.2006;

Laws related to forests and forestry:
- Law on Environment Protection 2009/03-L-025;
- Law on Local Self-Governance 2008/03/2004;
- Law on Nature Protection 2010/03/-I-233;
- Law on Strategic Environment Assessment 2010/03–L- 230;
- Law on Mines and Minerals 10/ 03/-L- 163;

Implementation & approximation of EU law

Kosovo* aspires to manage its forests in accordance with the statement of principles for a global consensus on the management, conservation, and sustainable development of all types of forests set forth in Annex III of the Report of United Nations Conference on Environment and Development (Rio de Janeiro, 3 - 14 June, 1992), by respecting the following principles:

- Preventive principle.
- Conservation of biological diversity.
- Principle of human equality.
- Sustainable ecological development. (Law on Kosovo* Forests No.2003/03).


The process of determining the network of NATURA 2000 areas in Kosovo* has not started yet, even though the legal framework and policies to this purpose have been promulgated. The Strategy and Action Plan on Biodiversity 2011 - 2020 identified the need for an inventory of protected areas in accordance with NATURA 2000 requirements. In the document “State of Nature Report, 2010 - 2014”, produced by MESP, harmonization of European Union Directives in the field of nature protection with the national legislation is listed, expressed as a percentage (%). It is also worth mentioning that Kosovo* is not a signatory of the Kyoto Protocol neither UNFCCC.

B3.2.6 Forest knowledge base

State of forest Inventories

National Forest Inventory verified an independent overview of the current forest situation of the country.
Kosovo\(^*\)’s second National Forest Inventory (NFI) was carried out in 2012/2013, ten years after the first forest inventory. The results of forest inventory have enabled monitoring of the forest resource base, making forest development policy and strategic planning by central forest authorities, to safeguard the use of wood products in harmony with the development of the forest resource base. Based on forest inventory data continued the compilation of the long-term forest management plans for public forests. Until 2016, 70,370.42 ha were covered by management plans. Furthermore, the following documents have been developed: Action Plan on Biodiversity 2016 - 2020 (MESP); National Afforestation and Reforestation Program (MAFRD) and Strategy on Non-timber forest products 2015 – 2020 (MAFRD).

**Educational system & forests**

The Forestry Faculty within the Prizren University has been established. Forest vocational training program was developed in 2012. However, financing is still not secured. To address the problems in vocational education in general, the National Qualifications Authority (NQA) has set up procedures for validation of occupational standards and accreditation of VET institutions. It has made progress approximating the National Qualifications Framework with the European Qualifications Framework. The Agency for Vocational Education and Training and Adult Education (AVETAE) became operational during the spring of 2014. It is emphasised that no activities were carried out in the implementation of the NQA. In order to strengthen the competencies in the forestry sector the Scanagri Sweden ABC and Norwegian Forestry Group (NFG) awarded scholarships to Kosovo\(^*\) students to study forestry in Austria, Croatia and Germany between 2005/2010.

**B3.3 Assessment of the Water sector**

**B3.3.1 Water resources and policy in the country**

Pursuant to the UNMIK Regulations 2002/5 and 2005/15, the Ministry of Environment and Spatial Planning is responsible for developing policies, norms and standards and the coordination of activities for environmental protection, water management, environmental inspection and spatial planning. It is also responsible for the implementation of the policies and legislation with respect to environmental protection and spatial planning.

To protect and ensure sustainable use of water resources, in 2014 the MESP developed the National Water Strategy of Kosovo\(^*\) 2015 - 2034, which is presently in the approval procedure. The overall purpose of this strategy is to ensure effective management of water resources as the crucial element of the economic development and social welfare of Kosovo\(^*\). In line with the principle of integrated water management, the strategy has a broad, multi-sectorial approach, which seeks to incorporate all important aspects of water management in Kosovo\(^*\), including but not limited to, supply of water to population and business in areas inhabited by water supply, wastewater collection and wastewater treatment.

Kosovo\(^*\) has a surface area of 10,908 km\(^2\) and a water catchment area of 11,645 km\(^2\). This means that there is an additional 737 km\(^2\) (6.3\%) catchment area impacting the water resources of Kosovo\(^*\). The average annual water flow/run-off reaches approximately 3.8 x 109m\(^3\)/year or 121.2 m\(^3\)/sec. In terms of hydrogeology, Kosovo\(^*\) is characterized by rocks with water permeability in several zones, whereas in areas around the River Sitnica there are catchment zones.

**Climate**

The geographical position of Kosovo\(^*\) gives the country its large annual temperature ranges with the summer temperatures above 30\(^\circ\)C, and winter temperatures as low as –10\(^\circ\)C. Kosovo\(^*\) has a mid-continental climate, with a dominant influence of the Adriatic Mediterranean climate in the Dukagjini Plain through the valley of the Rivers Drini i Bardhe, and with a lesser impact of the changing Adriatic-Aegean climate in the Kosovo\(^*\) Field.
Table 3.11 Climate data for Pristina weather station for period 1961 - 1990 (Source: Republic Hydro Meteorological Service of Serbia (Modified table 2016).)

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan'</th>
<th>Feb'</th>
<th>Mar'</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug'</th>
<th>Sep'</th>
<th>Oct'</th>
<th>Nov'</th>
<th>Dec'</th>
</tr>
</thead>
<tbody>
<tr>
<td>High temp. °C</td>
<td>15.8</td>
<td>20.2</td>
<td>26.0</td>
<td>29.0</td>
<td>32.3</td>
<td>36.3</td>
<td>39.2</td>
<td>36.8</td>
<td>34.4</td>
<td>29.3</td>
<td>22.0</td>
<td>15.6</td>
</tr>
<tr>
<td>Low temp. °C</td>
<td>-27.2</td>
<td>-24.5</td>
<td>-14.2</td>
<td>-5.3</td>
<td>-1.8</td>
<td>0.5</td>
<td>3.9</td>
<td>4.4</td>
<td>-4.0</td>
<td>-8.0</td>
<td>-17.6</td>
<td>-20.6</td>
</tr>
<tr>
<td>Mean temp. °C</td>
<td>-1.3</td>
<td>1.1</td>
<td>5.0</td>
<td>9.9</td>
<td>14.7</td>
<td>17.8</td>
<td>19.7</td>
<td>19.5</td>
<td>15.9</td>
<td>10.6</td>
<td>5.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Rainfall mm</td>
<td>38.9</td>
<td>36.1</td>
<td>38.8</td>
<td>48.8</td>
<td>68.2</td>
<td>60.3</td>
<td>51.6</td>
<td>44.0</td>
<td>42.1</td>
<td>45.4</td>
<td>68.2</td>
<td>55.5</td>
</tr>
</tbody>
</table>

According to Table 3.11, data regarding the yearly average rainfall is 597.9 mm and annual average of temperature is 9.8˚C (minimal temp -27.2˚C and maximal temp 39.2).

The main local factors affecting the climate of Kosovo* include landscape, water resources, soil and vegetation. Kosovo* has all forms of precipitation. The most important forms of precipitation include rainfall in the valleys and snowfall in high mountainous areas (Bjeshket e Nemuna/Prokletije and Sharr/Sari Mountains), with an average annual precipitation of 600 mm in the eastern part, and over 700 mm in the western part of Kosovo*.

The largest annual amount of precipitation occurs in the Bjeshket and Nemuna/Prokletije Mountains (1,750 mm). Snowfall is common in the winter. The average length of snowfall is 26 days in lower parts and 100 days in higher areas of Kosovo*. The first precipitation measurement station in the territory of Kosovo* started its observations in 1925. The Kosovo* Hydro-meteorological Institute (KHMI) conducts precipitation measurements in its observation stations located across several parts of Kosovo*.

B3.3.2 River basin management

In hydrographical terms Kosovo* is divided into four hydrographical river basins: the Drini i Bardhë/Beli Drim, Ibri/Ibar, Morava and Binçës/Binacka Morava and Lepeneci/Lepenac which then continue flowing into three seas:

- The Black Sea (50.7%);
- The Aegean Sea (5.8%), and;
- The Adriatic Sea (43.5%) (see annex IV).

The groundwater reserves are limited and are mostly located in the western part of Kosovo*. The groundwater and the surface water reserves are larger in the western part as compared to the eastern part. In the eastern and south-eastern part however, where water is scarce, water needs are very large. The main surface accumulations used mostly for drinking water are to be found in the artificial lakes, e.g. Ujmani/Gazivoda, Batllava, Badovci, Radoniqi, Livoqi and the Prelepnica Lake. Their total accumulated water reaches on average 563 million m³.

Kosovo* also has important sources of thermal waters that are mostly used for recreation and health purposes. (Figure 5. River basin map (Source MESP 2010).

The Water Department in the MESP distinguishes two river basin districts for water management:

- River Basin District of the Drini i Bardhë/Beli Drim; and
- River Basin District of the Ibri, Morava e Binçës and Lepenci.

The respective river basin authorities are based in Pristhina currently and are supposed to report to the minister. For the time being it is still unclear as to whether these authorities will be independent in the future or part of the MESP. The responsibilities are expected to be determined by a sub-legal act of the Ministry.

Water resources

Water abstraction comprises all quantities of both directly abstracted and secured water (underground,
spring and surface water) delivered to legal entities during a reference year, whether these quantities are used for own consumption, ceded or sold to other users. The total annual water flow/runoff is approximately 3.8 x 10^9 m^3/year. The main hydrological feature of Kosovo* is the unequal water distribution and insufficient water resources in comparison to its needs. From the total abstracted water in Kosovo* 89% are from surface water bodies (rivers, lakes and accumulations), while just 11% is abstracted from underground waters. According to the data from Kosovo* Water Authority (KWA), Irrigation Providers (IP) and Industries the total of abstracted fresh water in 2015 is 264.5 M m^3.

Table 3.12 shows total values of the abstracted water from surface and underground water bodies during the five-year period (2011 - 2015) and total water use from different users during this period. Data used in the modified table are taken from different sources and stakeholders like Kosovo* Statistical Agency, Water Regulatory Authority, water companies and industries. Modification of the table was made by the expert of this report.

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh surface water abstracted</td>
<td>245.13</td>
<td>245.26</td>
<td>228.58</td>
<td>218.14</td>
<td>235.37</td>
</tr>
<tr>
<td>Fresh groundwater abstracted</td>
<td>30.30</td>
<td>30.31</td>
<td>28.25</td>
<td>26.96</td>
<td>29.10</td>
</tr>
<tr>
<td>Total freshwater abstraction</td>
<td>275.43</td>
<td>275.57</td>
<td>256.83</td>
<td>245.10</td>
<td>264.47</td>
</tr>
<tr>
<td>Total water use</td>
<td>179.03</td>
<td>179.12</td>
<td>172.08</td>
<td>171.60</td>
<td>185.13</td>
</tr>
</tbody>
</table>

Decreasing the total water abstraction in 2013 and 2014 is due to water cuts for domestic and agricultural use due to the drought seasons. From total abstracted freshwater around 25 - 35% are technical losses because of leaks from old or poorly maintained infrastructure while the commercial losses are estimated to be around 20 - 25%. From the total freshwater abstraction, the domestic water and irrigation take the biggest portion (more than 90%).

**River basins and topography**

Kosovo*’s territory and its landscape is predominated by mountainous areas which represents a real mosaic of hollows of varying sizes, surrounded by medium to high mountains. The topographic water catchment area in Kosovo* is 11,645 km², while existing accumulation reaches 569,690.00 m². Rivers with the greatest annual flux are located in the basin of Drini and Bardhe/Beli Drim in the Dukagjini Plain. The Black Sea basin, which consists of the Rivers Ibri, Sitnica with its two main tributaries Llapi and Drenica, and Morava Binçës river. The Adriatic Sea basin has the Drini i Bardhë (White Drin) with Lumbardhi and Pejës, Deçanit, and Lombardhi and Prizrenit, Kliina, Mirusha and Topluha as its tributaries. The Aegean Sea basin has the River Lepenci with the Nerodimja as its main tributary.

**River basin management plan and implementation**

The main strategic document for the water sector is based on the Kosovo* National Water Strategy Plans for Management of River Basins made pursuant to Article 32 of the Kosovo* Water Law. According to the Kosovo* National Water Strategy the first River Management Plan (RMP) is foreseen to be issued in 2015 for the period 2016 – 2021, and which will subsequently be reviewed and updated in accordance with the following schedule:


However, since the Kosovo* National Water Strategy is still not approved due to financial implications, the development of River Basin Management Plans could be postponed.
The legal framework and strategic development plans for the sector are almost completed and they meet the needs for the management, development and sustainable utilization of water resources. However, neither a Kosovo* Water Council nor a River Basin Authority have been set up so far and therefore are not operational yet and new regulations and mechanisms for the stronger involvement of municipalities in the management boards of these authorities are not effective.

B3.3.3 Flood management

Floods as a natural phenomenon are often caused by intense precipitation and rapid snowmelt. The landscape and morphological features in Kosovo*, such as wide fields surrounded by mountains, result in wide ranging and dynamic floods. Relatively hollow unregulated and unmaintained riverbeds, throwing waste into rivers and uncontrolled use of inert materials from riverbeds results in wider floods in Kosovo*. The rivers at flooding risk amounts to a length of 491 km, but river banks have been built only for 140 km (28%). Those are however not well maintained. Those measures protected 64,200 ha in total with round 35,000 ha being agricultural land in the past. But based on the data of KEPA, today only 16% of these protected surfaces could be counted as protected area due to not appropriate maintenance and damages of embankments in Drini i Bardh river basin. Floods in Kosovo* occur either in spring (March, April) or autumn (October and November), but in the past (2013/2014) major floods occurred in January and February. The following river valleys are mostly at risk from floods: Drini i Bardhe in Dukagjini Field, Sitnica River in the Kosovo* Field, Morava e Binçes River in Gjilan and Viti, Lepenc River in Kacanik, Liap River in Podujeve, Drenica River in Drenas/Glogovc and the valley of Kлина River in Skenderaj (See, Annex).

An Early Warning System for the Drini River basin was established during 2012-2014 through a project named “Climate Change and Adaptation in the Western Balkans”, which was financed by GIZ.

Mountain hazards related to water (torrent, landslide)

Soil erosion due to water is one of the most widespread forms of soil degradation in Kosovo*, mostly in the steep forest lands and agricultural land along rivers. Landslides are caused mainly by the torrential mountain streams and rivers such as the Ereniku and Lepenci, or river tributaries of Lumbardhi i Pejës dhe Deqanit/Pecka i Decanska Bistrica. In addition the exploitation of inert materials from riverbeds affects the entire ecosystem of rivers, causes landslides and results in overflows and floods. The most degraded rivers are Drini i Bardhë, Lumbardhi i Pejës, Ereniku, Desivojce, Krivareka and Ibër.

History of floods and consequences

Floods affect fields along rivers almost every year, with major flood events taking place in March 2013 and April 2016, causing considerable economic and ecological damage. Table 3.13 provides some additional details about affected areas and damage caused to houses, livestock, businesses, infrastructure and agricultural lands.

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected areas, municipalities</th>
<th>Extent of damage</th>
</tr>
</thead>
</table>


**Flood risk management plan**

Intense precipitation during autumn, rapid snowmelt in spring and very dry summer months cause large changes between minimum and maximum levels of water flows in rivers in Kosovo*. Furthermore uncontrollable use of inert materials from riverbeds, disposal of waste into rivers, and unregulated and unmaintained riverbeds result in wider floods in Kosovo*.

According to the article 46 of the Kosovo* Water law municipalities are in charge of the protection against harmful water actions and erosion in urban areas, while river basin authorities are responsible for the protection on river basin levels. Both are also in charge for preparing action plans, construction, and maintenance of the protection infrastructure.

The hydrometric network in Kosovo* is currently inadequate to provide a comprehensive and reliable flood (and drought) forecasting system. An effective flood management framework plan would however need the establishment of a continuous and reliable monitoring system that includes the most important hydro-meteorological parameters.

**B3.3.4. Water quality**

**Classification of the ecological state of water bodies**

In 2008 the MESP, supported by a project based on some historical data and partially available data from 2000 – 2013, produced one map regarding the quality of surface water using the UNECE Water Quality Classification standards (See Annex VI). However, there is no still water quality classification based on the EU WFD standards due to a lack of capacities and proper data monitoring. According to the biological analysis which was carried out between 2008 and 2009 downstream for towns like Peja and Prizren, results highlighted that the status of the water bodies had deteriorated dramatically due to urban pollution. The ecological status of the waters down stream of these towns is very low. There is no monitoring network for groundwater quality. Groundwater quality is also affected by pollution from untreated wastewaters from municipalities and industries. Therefore, the land use map, as well as the information on the hot spots for water quality, provides some information about the possible risks of contamination groundwater.

**A map of the monitoring network**

The monitoring of rivers in the territory of Kosovo* is conducted by the Kosovo* Hydro-meteorological Institute. The water quality of these rivers is determined based on physical-chemical analyses and the presence of heavy metals. It analyses a range of important basic physic-chemical parameters such as turbidity, temperature, pH, conductivity, biological oxygen demand, chemical oxygen demand, nitrate, ammonium, phosphate, and alkalinity are looked at.

The monitoring network consists of 54 stations. Currently, 10 physical parameters are monitored (11 times a year), 39 chemical parameters (11 times a year) and 8 heavy metals (2 times a year). The basin of Drini i Bardhe include 10 rivers with 23 monitoring stations, the basin of Iber includes 8 rivers with 18 monitoring stations and the basin of Morava and Binqes/Binacka Morava included 2 rivers with 6 monitoring stations (See Annex VI). At this time there are no groundwater quality monitoring stations in the river basins. There are proposals currently being considered by the Government to implement such a network.

**Surface water (ecological and chemical status)**

Even though there is no classification based on EU / WFD results of physical-chemical data, monitoring results over the last five years in Kosovo* show that the quality of water at all river sources is good, but the situation starts to change when approaching settlements due to the discharge of wastewater and water from industrial collectors along the flow of river basins.

As a result of discharges of household wastewaters and industrial water and waste dumping the most polluted rivers are the River Sitnica with its tributaries starting from Ferizaj and up to Mitrovica, the River Drini Bardhe at the point of confluence of the Rivers Drini i Bardhe, and Klina. The quality of water in the
River Lepenci at both sources is good and this level is maintained until the Silkapor factory discharge site where sampled water occasionally has higher turbidity as a result of the discharge of water used in the factory.

**Groundwater (chemical and quantitative status)**

According to the Kosovo* Water Master Plan 1983 - 2000, the Dukagjini Plain has the greatest groundwater potential. As part of the “Development of Water Resources in Southeastern Kosovo*” project, geophysical studies of groundwater were conducted during 2005 - 2007 in the municipalities of Gjilan and Ferizaj (basin of Morava and Binçes/ Binacka Morava). Furthermore, during 2008 - 2010 as part of the activities of the EC supported project on the basin of Drini and Bardhe, groundwater survey sites were planned for this basin.

However, in Kosovo* the monitoring of groundwater is not at all satisfactory and therefore there is a lack of data regarding the quality and quantity status of ground waters.

**Waste water treatment and reuse**

The collection of urban wastewater is, as with water supply, a public service managed through the Regional Water Companies and several other much smaller local operators. Currently there is only one urban wastewater treatment plant operating in Kosovo*, which is in Skenderaj with a capacity to treat water for a population of about 8,000 people. Several other smaller rural treatment facilities are also in operation. However, considerable efforts have been made to prepare for the implementation of wastewater treatment in all the major cities; so far feasibility studies having been completed for Prishtinë, Gjakova, Gjilan, Pejë and Prizren. Feasibility studies for Ferizaj and Mitrovica are planned soon. The wastewater collection systems in urban areas also serve for the drainage of storm water (urban run-off), i.e. the sewage systems are combined. Many smaller industries discharge their wastewater into public wastewater collection systems. Larger industries may also discharge their wastewater to the sewer or directly into the environment. There is no data about the total discharged waste waters from settlements and industries, but referring to the Water Polluter Cadastre report from the project implemented in 2010 from the Regional Environmental Centre (REC) office, in Kosovo* it is estimated that 60% of the total amount of used water will be considered as a waste water discharged into the environment. Regarding this assessment the total waste water discharged into the environment is calculated from the total used water from settlements and industries in the following table.

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total discharged water, in mill. m³</td>
<td>107.42</td>
<td>107.47</td>
<td>103.25</td>
<td>106.96</td>
<td>111.08</td>
</tr>
<tr>
<td>- from settlements</td>
<td>94.75</td>
<td>92.21</td>
<td>90.80</td>
<td>95.48</td>
<td>98.084</td>
</tr>
<tr>
<td>- from industry</td>
<td>12.67</td>
<td>15.26</td>
<td>12.45</td>
<td>11.48</td>
<td>12.99</td>
</tr>
</tbody>
</table>

**B3.3.5 Water demand**

**Water supply**

The main hydrological feature of Kosovo* is the unequal water distribution and insufficient water resources in comparison to demand. Water services for domestic use in Kosovo* are provided by seven licensed Regional Water Companies (RWC), while 30% of the population is supplied by their own water system from surface or underground waters and other different systems managed by them. Serb majority municipalities (Štrpce, Novobërđë/Novobrdo, Leposavic, Zubin Potok, Zvečan and the northern Mitrovica) are not provided with services by the RWCs.

As it shown in Table 3.15 the population in Kosovo* is supplied through public systems managed by the RWC, this is almost 70% (1,218,000 people), while almost 10% are supplied by water supply systems not
managed by the RWCSs. About 18% have their own individual supplies. Also, there is a considerable number of rural water supply systems that are not operated by RWC’s (about 200), but are part of communities such as villages and are not included in this assessment. While around 65% (or 1,130,000 inhabitants) are served with sewerage services by public companies.

According to Table 3.16, the largest amount of distributed water in 2015 was for drinking purposes, (137 million m³ or 308.24 l/day/capita) while the total water amounts delivered for agricultural needs in 2015 was 112 million m³ while the main industries used in 2015 15.3 million m³ as cooling water. The total losses, whether technical or commercial, are about 55% from total distributed waters to the customers. This is given the critical situation of water supply a considerable important problem to tackle.

### Table 3.15 Availability of water supply system (Source: Statistical Agency of Kosovo*, Census Report (2011).)

<table>
<thead>
<tr>
<th>Nature of supply</th>
<th>Household units</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water supply from public services</td>
<td>204,365</td>
<td>69.6%</td>
</tr>
<tr>
<td>Water supply from other services</td>
<td>82,609</td>
<td>28.2%</td>
</tr>
<tr>
<td>Pipeline water system within building outside household unit</td>
<td>899</td>
<td>0.3%</td>
</tr>
<tr>
<td>Pipeline water system outside buildings</td>
<td>3,413</td>
<td>1.2%</td>
</tr>
<tr>
<td>Water supply system not available</td>
<td>2,157</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>293,443</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

### Table 3.16 Water supply (Source: Kosovo* Water Authority, Irrigation Provider and Industries (Modified table)).

<table>
<thead>
<tr>
<th>Kosovo*</th>
<th>Distributed waters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, thousand m³</td>
</tr>
<tr>
<td>Kosovo*</td>
<td>264,470</td>
</tr>
</tbody>
</table>

### Water scarcity and droughts

It is estimated that Kosovo* has only 1,600 m³/capita/year. Kosovo*’s territory, in a year with average rainfall and an annual water flow/runoff, is approximately 3.8 x 10⁹m³/year or 121.2 m³/sec. Today the water demand in Kosovo* has reached a level of 230 - 260 million m³/year with a tendency increase, mainly in the agricultural sector, and the drinking water sector. Taking into consideration that Kosovo* is a country in transition, it is also expected that in the future the demands for water use for industry purposes will increase ("Kosova e Re" thermo-power plant). Because of the droughts in 2013 and 2014 the total water abstraction was 220 - 228 million m³/year. While knowing that as a result of climate change the average temperature has recorded a small increase it can therefore be expected having drier years a much more efficient way of reducing the quantities of water usage without jeopardizing economic activity and human health.

### Irrigation

Of the total 57,100 ha under irrigation in 1989, only 21,150 ha were under irrigation in 2001. Of these, in 2003 only 10,700 ha were effectively irrigated. The reduction in irrigation is due to poor maintenance and operation in the 1990’s as well as being due to the overall damage of the irrigation infrastructure
sustained during the war, and urbanization of the agricultural land after the war. From the total irrigable surface of 57,100 ha in 2014, 22,880 ha of agricultural land where effectively irrigated. The largest portion of irrigated land can be found in the Dukagjini region with about 39.5% of the total cultivated agricultural land, while the smallest area is in Gjilani region with 4.8%. Total water abstraction for irrigation needs was 112,116,000 m³ in 2015.

B3.3.6 Institutional set-up of the water sector, legal and policy governance

Organization of the water sector

Competencies on water management in Kosovo* are divided among six ministries and local authorities as follows:

- Ministry of Environment and Spatial Planning (MESP) is responsible for the overall water resource management.
- Ministry of Agriculture, Forestry and Rural Development (MAFRD) is responsible for irrigation and drainage through Water Companies and Water User Associations responsible for on field delivering water.
- Ministry of Economy Development (MED) is responsible for ground water extraction and hydro energy production, water companies.
- Ministry of Health (MH) is responsible for the quality of drinking water.
- National Institute for Public Health (NIPH) is responsible for the daily monitoring of the quality of drinking waters and bathing waters.
- Inter-ministerial Council for Waters provides professional opinions and recommendations on water policy, laws and other sub legal acts, and participates in the drafting process of Water Strategy and Management Plans.
- Kosovo* Water Authority / formerly the Water and Waste Regulatory Office – manages an effective regulatory framework, which encourages water service providers in Kosovo* to ensure a high quality service in the monetary value paid by customers.
- Local governments’ responsibilities in the water sector are to manage sources for important water supply at the local level such as natural water springs, public springs, public wells and ditches.

Water Department - According to the Law on Waters the Water Department within MESP is also the responsibility for determination and implementation of policies for water development, management of water resources; development of water strategic plan and other plans for water management; and other organizational and development tasks pursuant to the provisions of the water law.

Kosovo* Environmental Protection Agency (KEPA) - Established in 2003 under the Law on Environmental Protection and is an institution within the MESP carrying out administrative, professional, scientific support and investigative tasks in the field of environmental protection. KEPA regularly reports on the state of the environment regarding water supply, water pollution, untreated sewage disposal, eutrophication and surface water monitoring.

Hydro Meteorological Institute of Kosovo* (HMIK) - According to the Law on hydro-meteorological activities (Law No. 02/L-79 of 2006) HMIK is in charge of executing all hydro-meteorological activities in Kosovo* which, among other tasks, include measurement and monitoring of hydrological information as well as publishing the information about the surface and ground water quality. The work of the Institute covers hydrology, meteorology as well as physical and chemical analysis of the environment (water, air and soil). From 2011 the organization and structure of the Hydro Meteorological Institute (HMIK) is under KEPA.

Regional Water Companies - The Law on Publicly Owned Enterprises (No. 03/L-087) categorizes publicly owned enterprises involved in drinking and irrigation water management into three groups: central public enterprises, regional public enterprises and local public enterprises.

- Central Public Enterprises: Public Company Hydro-system Iber-Lepenc JSC.
- Regional Irrigation Companies: Irrigation Company “Drini I Bardhe JSC and Irrigation Company “Radoniqi-Dukagjini” JSC.
Regional Water Companies: “Pristina” JSC, Pristina; “Hidrodrini” JSC, Peje; “Hidroregjioni Jugor” JSC, Prizren; “Mitrovica” JSC Mitrovice; “Hidromorava” JSC, Gjilan; and “Radoniqi” JSC, Gjakova.

Association of Water and Wastewater Companies of Kosovo* (SHUKOS/AWWCK) – A non-governmental organization established to act as a liaison between its members, and to promote their common interests and fundamental issues of their scope of action. The main members of SHUKOS include all public companies of water and wastewater services in Kosovo*. The highest body of the association is the Assembly, which elects the Board of the Association.

Legal framework
The legislative basis for Water Protection and Water Resource Management in Kosovo* is the Water Law No.04/L-147, which was adopted by the AoK on 19 March 2013, promulgated on 5 April 2013 and published in Official Gazette on 29 April 2013, and monitors the state of the environment.

The legislative basis that is currently regulating the water and wastewater management sector in Kosovo* consists of the following primary and secondary legislation:

- Law No. 04/L-147 on Water, Promulgated by Presidential Decree on 05.04.2013.
- Law No. 2009/03-L-025 on Environmental Protection.
- Al No. 2/99 “on Testing and Enforcing Minimum Standards of Drinking Water Quality”.
- Al No. 24/05-MESP “on the Content, Form, Conditions and Method of Issuing and Retaining the Water Permit”, dated 11.10.2005.
- Al No.06/2006 “for water payment structure”, dated 02.2006.
- Al No. 06/07-MESP “on the Content of Water Infrastructure”, dated 08.06.2007.
- Al No. 08/26 “on Limit Values of Effluents Discharged in Water Bodies and in Public Sewage Network” approved by the Government of Kosovo* (GoK) on 09.07.2008.

Other relevant legislation
- Law No. 04/L-125 on health.
- Law No.02/L-9 on irrigation of agricultural lands and Law No. 03/L-198 on the amending and supplementing of law no.02/L-9 on irrigation of agricultural land.
- Law No. 03/L-040 on local self-government.
- Law No. 03/ L- 049 on local government finance.
- Law No. 03/L-041 on administrative municipal boundaries, and;
- Law No 2003/14 on Spatial Planning.

Implementation & approximation of EU law
The implementation and transposition status of the EU environmental acquis communautaire reached 49% as regards the Water Framework Directive 2000/60/EC, 87% as regards the Drinking Water Directive 98/83/EC, 44% as regards the Directive for Polluted Urban Waters (91/271/EC), 25% as regards the Nitrate Directive (91/676/EC) and 12% as regards the Floods Directive. The Bathing Water Directive was not implemented at all.

Some Directives are still in the early stage of transposition, and significant progress has been made with the adoption of the new Water Law in 2013, but still further progress is necessary to complete transposition through the revision/elaboration of a number of Administrative Instructions. The FD is at an early stage of implementation in Kosovo*. Regarding the coordination between the implementation of the FD 2007/60/EC and the WFD2000/60/EC (WFD) the coordination between the MESP and the Ministry
of Interior currently being developed. A detailed implementation plan for the FD has not been developed as yet. The implementation of some provisions from WFD is under the responsibility of the Ministry of Agriculture (Law on livestock 2004/33, law on fertilizer 2003/10 and administrative instruction for quality of fertilizers 10/2006). Implementation and transposition of the provisions and standards from the Drinking Water Directive (DWD) are under the responsibility of the Ministry of Health. A working group has been created between MESP, the Ministry of Health and the Institute of Public Health to prepare the necessary administrative instructions.

B3.4 Assessment of the soil management

B3.4.1 Status of the soil data

Kosovo*, despite being a small sized country, has a great variety of topographical features. It is surrounded by mountains - The Sharri/Šari Mountains are in the south and southeast, bordering Macedonia, while the Kopaonik Mountains rise in the north. The southwest borders with Montenegro and Albania are also the location of Bëshkët and Nemuna/Prokletije. The central region is mainly hilly, but two large plains spread over Kosovo*’s west and east, respectively; Dukagjini and Kosovo* plain. Kosovo* possesses diverse soils and this is an outcome of the landscapes structure, geographic base, flora, climate and hydrography. It is estimated that 15% of Kosovo*’s soil is of high quality, 29% is medium quality, and 56% is poor quality. The high and medium quality soils account for 44% of total land. Of the total area of Kosovo* (10,908,000 ha) around 577,000 ha of land is classified as agricultural land and 464,800 ha as forest land. From the total classified agricultural land 414,000 ha is being cultivated and 180,340 ha is arable land, (mostly cereals, industrial crops, and vegetables) and 7,860 ha perennial crops/ fruits and vines; and 224,600 ha is grassland, mostly situated in high mountainous areas. Kosovo*’s agriculture is characterized by small farms, low productivity and a lack of sufficiently effective advisory services. The average farm size is of around 2.2 – 2.4 ha, separated into 6 - 8 parcels/plots, while around 80% of parcels are 0.5 - 2.0 ha in size, which makes it impossible to develop a competitive form of agriculture. Due to the uncontrolled urbanization, a lot of fertile soil has been lost to house and road constructions, mine dumpsites and other constructions.

B3.4.2 Monitoring of soil

Status of soil

Kosovo* possesses diverse categories of soils, even though its territory is small. The more fertile lands are composed of humus soil (11%) that is mostly distributed in the Kosovo* plain, grey carbonate land (8.4%), alluvial (7.8%) and other dark and serpentine soils. Poor quality soils are mostly found on hilly and mountainous areas. They are composed of acidic grey soils, diluvia lands, swamps and other infertile soils. The texture of most of the soils is loamy, clay and clay loamy, whereas in some profiles sandy loam texture. The pH in H2O is mostly weak acidic, basic and weak alkaline, decreasing with depth. The most represented soils in Kosovo* are CAMBIC land (about 42%), then RANKERES (11%), VERTISOLET (SMONICA) 10%, while FLUVISOLET and KOLOVIUMET constitute about 14%. These types of lands are characterized by certain physical and chemical characteristics, mainly acidic reaction, poor in organic material and poor and to average nutrients.

Indicators for assessing the risk of land degradation

Kosovo* is facing very serious environmental issues concerning land management and discharge of land pollutants into agricultural land, releases of wastewater and raw sewerage into rivers and construction activities within natural floodplain areas and on agricultural land. Sites for deposition of mining-waste are high-risk areas for pollution of land and groundwater with toxic and heavy metals. The main soil degradations are erosion caused by water streams and torrents, forest cutting, forest fires, stone extraction from forest lands and uncontrolled use of inert materials from river beds, waste disposal and dumpsites and uncontrolled urbanization. The erosion rate in Kosovo*, with its detrition strength, is estimated to be
about 12mil/m³ annually or around 460m³/km² or around 5m³/ha. Reduced organic matter fractions of the soil is the lightest and most easily eroded low lands along the Sitnica, Drini i Bardh/Beli Drim.

B3.4.3 Soil degradation

Erosion

The more significant erosive activities are identified in the upstream of the River Ibri, also along areas of the Lepenci River basin are endangered by erosion as well as the river basins of the Drini and Bardhë/Beli Drim and Morava e Binçës/Bincka Morava. Lower erosion activities are noted in the Sitnica River basin. Kosovo’s rivers are degraded mainly by uncontrolled use of inert material from river beds by the activities of operators that extract the gravel in and around the rivers. The most damaged rivers are those in the Drini i Bardhë/Beli Drim river basin area. Among damaged rivers due to uncontrolled use of inert is the Lumbardhi i Pejës/Pečka Bistrica River. The existing situation of erosion for the entire territory of Kosovo*, according to quantum methodology of Dr S. Gavrilovic is presented in Table 3.17 below.

Table 3.17 Categories and total erosion  (Source: Water Master Plan 1983, Former Yugoslavia.)

<table>
<thead>
<tr>
<th>Soil erosion categories</th>
<th>Surface affected (km²)</th>
<th>Surface affected (% of total area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category I, II, II</td>
<td>5,973 km²</td>
<td>55.6%</td>
</tr>
<tr>
<td>Category IV (weak erosion)</td>
<td>6,680 km²</td>
<td>34.2%</td>
</tr>
<tr>
<td>Category V (very weak erosion)</td>
<td>1,097 km²</td>
<td>10.2%</td>
</tr>
<tr>
<td>Total</td>
<td>10,750 km²</td>
<td>100%</td>
</tr>
</tbody>
</table>

Erosion of Categories I, II, III and IV includes an area of 9,653 km², or 89.8% of the total area. Essentially this means that there is no erosion risk for fields of category V. The most endangered categories are III and IV, where the processes of medium and weak erosion are more developed.

Land cover and changes in land use

As a result of massive migration of population from rural to urban areas after the war, construction in the agricultural lands around urban areas and along main roads have greatly influenced the change of land use. According to the Ministry of Agriculture, Forestry and Rural Development in Kosovo* it is estimated that about 400 ha of agricultural land each year are changed by the user into land for construction.

Referring to Figure 3.3 (below), land cover in Kosovo* has been characterized by 27 (in 2000) and 26 (in 2006) out of 44 classes of the CORINE Land Cover nomenclature. The analysis of land cover database revealed that semi-natural and forest areas significantly dominate Kosovo* spreading over 57% of the country’s total area. Some 36% of the total area of the country is occupied by broad-leaved forest, 3% by coniferous and mixed forest and 9% by transitional vegetation. Agricultural areas cover 40% of Kosovo*, mostly by complex cultivation patterns -17% and 12% by principally agricultural land with areas of natural vegetation. Land classified as artificial areas occupied nearly 2.3% and the rest of the national territory of about 0.2% was classified as water (See Corinne map in Annex).
Decline of organic matter and biodiversity

Soil organic matter is a source of food for soil fauna, and contributes to soil biodiversity by acting as a reservoir of soil nutrients and main contributor to soil fertility. Based on actual investigations in Kosovo* are inventories of around 1,800 species of vascular flora, but it is supposed that this number is higher and reaches around 2,500 species. Because of land degradation affected by an intensive cutting of forests and due to forest fires, stubble burning after harvesting cereals, a change of use of agricultural land, intensive urbanization, intensive grazing of pastures soil erosion has had a very strong impact on the trend of decline of the content of organic matter in soils and biodiversity in Kosovo*. Recent trends in land use and climate change in Kosovo* have resulted in soil organic carbon. However, in Kosovo* there is no developed methodology of analysing organic carbon and network for soil monitoring.

Management of contaminated sites

Kosovo* has not yet developed a soil monitoring system and therefore there is a lack of data on the quality of the soil. However, the Environmental Protection Agency of Kosovo* through various projects has identified 110 polluted and contaminated sites. Of these 110, 28 facilities have a high pollution potential but also are proposed to be declared as environmental hotspots. According to the findings from the project “Further support for land use” funded by the EU the more polluted and contaminated areas are close to large industries such as thermo-power plants Kosovo* A and B, Ferronickel, Trepça/Trepča mines, Silcapor, Sharcem cement factory, along rivers and nearby landfills. The poor maintenance of 5 regional landfills by Kosovo* Landfill Management Company has resulted in wastewater leaching from landfills in the land around them causing pollution of water in streams and soils.
B3.4.4 Institutional set-up concerning soil management, legal and policy governance

Organization of soil management

Competencies on soil management in Kosovo* are divided among two ministries and local authorities as follows: Ministry of Agriculture, Forestry and Rural Development (MAFRD), Ministry of Environment and Spatial Planning (MESP). MAFRD is in charge for policy and strategic documents on agricultural land use, agriculture and rural development plans as a guide documents.

According to the law on Agriculture Land and law on Land regulation and land consolidation the Department for Agriculture policies and Markets, Division for Land use, GIS, Register and LPIS within the MAFRD is responsible for agricultural land use, land protection from degradation, and monitoring of fertility of agricultural land at a national level. While the Department of the Forestry according to the provisions of the forest law is in charge for forest land use, forest land protection and monitoring of the forests and forest lands.

Kosovo* Agriculture Institute – The mandate of the KAI is technical and scientific support to technical departments of MAFRD, quality control of agricultural inputs, food and preservation of the environment, research varieties of crops in agro-ecological conditions of Kosovo*. Monitoring and evaluation of the production qualities and fertility of the land in Kosovo*, research, identification and inventory of harmful biological agents (pests, pathogens, weeds, etc.) in Kosovo*.

Kosovo* Forest Agency - KFA is responsible for issues related to forest and forest lands, the administration and management of public forest lands and forests in National Parks in Kosovo*.

While the MESP is responsible for environmental protection, biodiversity and climate change policy and strategic documents.

Division of the Nature Protection (MESP) –Is responsible for the protection of nature based on the law and sub-acts on Protection of Nature. Participates in drafting legislation on nature protection, policies and strategic documents for the protection of the environment. Proposes measures and projects for the rehabilitation of the “hotspots”.

Legal framework

The legislative basis that is currently regulates the soil sector in Kosovo* consists of the main primary and secondary legislation:

- Law No. 02/L-26 on Agriculture Land.
- Law No.04/L-040 on Land Regulation.
- Law No. 04/L-120 on Plant Protection.
- Law on Forest and forest land and respective secondary legislation.

The Law on Agricultural Land determines the use, protection, regulation and lease of agricultural land for permanent preservation and protection of agricultural potential, and shall be used for agricultural production except in cases as provided for by this law, and other provisions issued in accordance with this law.

The Law on Land Regulation is to undertake measures and activities on a voluntary basis for creation of the biggest parcels and regulation of the agricultural land, forests and forest lands in the function of more rational and economic use.

Implementation & approximation of EU legislation

There is currently no main soil legislation in place in the EU, but a thematic strategy on soil protection that aims at preventing further degradation while also preserving soil functions and restoring degraded soils. In this regard, no specific regulations exist to date in Kosovo* and therefore it can be concluded that the soil
legislation is no approximated, despite the Law on Forests in Kosovo*, which indirectly addresses soils as well.

Nevertheless, Kosovo* has drafted quite good legal framework on agricultural land and land regulation but the implementation and enforcement of existing legislation is not systematic.

**B3.5 Overview of the Forestry/Water/Soil/Natural Resource Management projects in Kosovo**

By the year 2000, investment and technical support to the forestry sector had been initiated, under the so-called “emergency phase”. Technical support and financial support with regard to human capacity building, development of legal frameworks, strategies, programs and forest management planning has continued on and is still prevalent, including here support in 2002/2003 and 2012/2013 for two forest inventories, supported by the Norwegian Forestry Group (NFG) that included formulation of the forest planning methodologies. There has also been an investment in providing assistance for 15 students to pursue Bachelors and/or Masters Studies in Austria, Germany and Croatia. According to the Forest Sector Progress Report 2014 - 2015, the forestry sector was supported by donor organisations during period 2010 - 2015 to the amount of 9,799,779.00 EUR and by the Government budget for the period from 2013 - 2015 to the amount of 2,827,330.86 EUR (See Table 3.8). The highest percentage of investments in the forestry sector has been refocused in forest management planning and on tending to young forests. The main donor organisations were the Governments of Sweden, Finland, Norwegian, FAO, CNVP, GIZ, USAID, NFG, and European Commission.

The investments in the water sector from the international donor community and the government of Kosovo* between 1999 and 2011 are estimated to be at least 255.77 million EUR in total. From this amount, approximately three-quarters are donations from the international community and one-quarter comes mainly from the Kosovo* Consolidated Budget (KCB). Major donors include the European Union, the Swiss Government SCO and the German Government through the German Development Bank/KfW, which together invested 154.9 million EUR, or 61% of the total invested sum. The year 2010 marked the most investments per year with 26.63 million EUR in total. According to the Donor Activity Report from 2012 - 2013, the largest portion of capital projects in the environment sector were supported by the Central Budget of Kosovo* with around 67% or 103,730.00 EUR, with the donor community contributing the remaining 33%, or 50,292,397 EUR.

In addition to contributing to the water sector, donor investments were also oriented in other environmental sectors, such as waste, biodiversity, land condition survey, spatial planning, climate change, and capacity building, etc. The main goal for the Environmental Program for Kosovo*, founded by Swedish SIDA as a four-year project, was to strengthen capacities of relevant institutions developing a red book on fauna, monitoring ground waters, and developing plans and programs for national parks. This program is in its inception phase.

One very important and active project is “Adapting to Climate Change in Managing the Risk of Flooding in the Western Balkans”, implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, aimed at helping hydro-meteorological institutes in Albania, Montenegro, Macedonia and Kosovo* to share real-time hydro-meteorological data in order to improve the early warning systems for the human population in case of flooding.

Other important projects related the soil/land use where supported by the European Commission include Agriculture Land Use Project (ALUP), Further Support to the Land Use (FSLU) project (Support to MAFRD) and Agriculture Land Pollution Survey in Kosovo* (Support to MESP and MAFRD).
B3.6 Evaluation of the main trends and gaps for natural resource management

The data presented shows that Kosovo* is covered with forests and forest land of approximately 44% of the total territory of the country. There is a significant domination of low canopy forest, including a high percentage of degraded forest, shrubs and bushes. Based on existing ecological and biological conditions in Kosovo*, growing and increasing stock is very low. Despite the annual forest growth of around 1.4 mill / m³, average annual legal harvesting, both in public and private forests is below 200,000 m³. This amount meets population demands for fuel wood at only around 14% and even less so, at about 12%, with construction wood. The minimum quantity of wood volume legally harvested in conjunction with poverty, high unemployment, very high wood price per cubic meter and other factors have affected forest damages. In this respect, it is foreseen that a domination of broadleaved coppice forests is expected, composed of main tree species of oak and beech as well as high forests with mainly broadleaved beech and coniferous forests and a very small participation of high growth tree species. These forests and forest land are managed by the KFA, the body under the jurisdiction of the MAFRD. Management of natural protected areas, including public forests belongs to the MESP. Responsibilities and roles in some cases overlap among three ministries (MAFRD-MESP and MTI) especially as it pertains to the management of commercial forest under national parks, grazing land, quarries and wildlife management. On the other hand, forest protection and subsequent development of tender procedures for forest utilisation fall under the responsibility of individual municipalities. In Kosovo*, there are no public logging companies, therefore forest operation activities are carried out by the private sector, selected through bidding procedures, processed by relevant municipal institutions. Licences of forest harvesting are based on very small forest areas (some forest compartments) on an annual basis. Forest, forest land, wildlife and other natural resources continue to be damaged despite the prevalence of very strict legal provisions for the punishment of illegal actions. Thus, the main problem remains – that of unlawful forest harvesting. Management of private forests continues to be a subject of complex administrative and technical procedures, even though the KFA has sought to tackle the issue by engaging private forest representatives while drafting the legislation, strategies and structuring the so-called “joint forest management”.

Data presented on the number of employees in operational forestry and wood based industries are calculated based on the development of various forestry projects and studies, using normal technical and logical calculations in the absence of reliable statistical data. A considerable number of employees in the forestry operations and wood-based industry are seasonal workers, and have not been registered in the relevant employment institutions. Forest owners engaged in forest logging operations are also often not registered in the employment bureau. It is worth noting that the main revenue in the sector has been derived from the renting of forest land; whose potential use could be the construction of touristic and recreational facilities. These facilities present the risk of permanently changing the destination of the land. Probably a reason for seeking alternative revenue generating sources comes from the relative share of Forestry within the MAFRD financial planning, which falls behind in comparison to agricultural and rural development sectors. In this sense, private forest owners have not been supported by subsidies and grants at the same rate as agricultural farmers. Such a trend seems to continue under the EU’s IPA (Instrument for Pre-Accession Assistance), a major funding package available for Kosovo*. Within this package, there is no specific Forestry Fund envisaged by the Law on Forest. Financial and technical support from international donors has been concentrated mainly on human capacity building and forest management planning, whereas participation of protected areas at a country level is around 10.9%. There is a solid legal basis that regulates management of natural resources, including forests and forest associate resources, but the main problem is weak law enforcement. The practices of natural resources management up to today have shown a need for legal and organisational regulation of certain issues through the proposal of new laws. As presented above, in this paper, two forest inventories were established in 2002/03 and 2012/13 timeframes. Results regarding these inventories present a solid picture of the forest state in Kosovo*. Presented data offer a good base for the development of strategies, programs and projects. The implementation of forest inventory will be implemented through long-term and annual forest management plans. Such plans are necessary in light of an observed lack of adequate professional treatment on assignment of harvesting and silviculture forms & methods by forest type, forest class, forest age, soil quality, forest species, etc.
Through analysis and review of competence and experience of the existing technical and skilled workers within the forestry sector, it can be concluded that there is an immediate need to organise higher forestry education and trainings, including trainings of private forest owners.

Kosovo’s water resources, as a key factor for sustainable development of Kosovo, are limited (1600 m³/water/year/capita) thus monitoring, protection and rational use of water resources is critical. The monitoring network of surface waters is quite well developed and consists of 54 stations but there is a lack of monitoring of groundwater quality, therefore, in the future special attention should be paid to this task. Capacity building for the monitoring of water resources remains to be considered in the coming years. Water losses, whether technical or commercial in nature, amount totally to approximately 55% and pose a considerable challenge to tackle in the future. Discharge of wastewater into the environment without any prior treatment increases the pressure on surface and groundwater sources. Water quality deteriorates, mainly in vicinity and around urban areas and big industries. Uncontrolled use of resources along with damaging the riverbeds remains one of the most expansive forms of water resource degradation. Water management resources competences in Kosovo are divided among six ministries, the Kosovo Water Authority, Regional Water Companies and local authorities, with overlapping responsibilities between central and local level authorities resulting in a fragmented water sector with inefficient operations and lack of transparency.

While the MESP staff skills have improved, in many fields the staff’s capacity is insufficient to perform complex analytical tasks required for water management or flood risk planning. This is especially the case where sophisticated software is needed for data processing, data control and interpretation of results. Often these tasks require high-level qualifications and many years of experience so as to be performed correctly. External support for some of these complex tasks will be needed over the coming years. To attract well-qualified and skilled specialists it is recommended to improve the conditions of employment in the public sector.

However, in the water sector much remains to be done throughout the sector, including in relation to water supply, wastewater collection, wastewater treatment, irrigation, drainage, flood risk management, erosion prevention and hydroelectric power generation. The capacity to invest in capital infrastructure projects is limited and there are many other competing demands from other sectors. Households have limited income and cannot afford high water tariffs.

The main institutional and legal issues in the water sector in Kosovo are:

- Water Department staff’s capacity is insufficient to perform complex analytical tasks required.
- River basin authorities are not established/are inefficient.
- Role of local government is not clear (overlaps with role of RWC).
- Insufficient cross boarder and inter-ministerial cooperation.
- Insufficient level of transposition of the EU Directives in the water legislation.
- Strategic documents are not approved (e.g. Kosovo Water Strategy).

While the main management challenges in the water sector are:

- Inadequate monitoring of surface and ground water sources.
- Extension of water services poorly developed in rural areas.
- Lack of protection of water sources.
- Lack of treatment facilities of polluted waters.
- Extension of water and sewerage water services.
- Lack of flood risk drought management plans.
- Lack of capacities for implementing the laws, and;
- Water losses are still very high due to leakage and illegal use of services.

Land resources in Kosovo especially agricultural land are very limited and it is estimated that today there are only 0.10 ha/capita of agriculture land with a trend toward further reduction. Farm size in Kosovo is very small with a tendency toward further fragmentation. This generally disallows sustainable agricultural production and revenue creation from the farms. A tendency to change the destination of agricultural land
towards urbanized and other non-agricultural use continues on. Another problem is pollution and land degradation; such as underground water pollution by discharging land pollutants into agriculture land, release of wastewater and raw sewage into rivers, disposing of urban and industrial waste, as well as erosion because of non-agricultural activities. On a larger scale, the agricultural land market is not yet fully developed and is still undergoing a continuing process of privatization throughout Kosovo*.

The main issues related to land protection and administration can be listed as following:

- Agriculture is still small-scale. Land tenure is small and extremely fragmented.
- Subsistence farming is predominant.
- The change of agricultural land into construction land is unrestricted. Efforts to control land use change have been unsuccessful so far. This has resulted in unnecessarily large areas of lost agricultural lands and inefficient urban development.
- Loss of investments in irrigation, to an invalidation of land consolidation, and to ad-hoc investments by the municipalities. In addition, this has resulted in a defunct market for agricultural land.
- Valuation and pricing of agricultural land are not transparent and do not reflect productive capacity.
- There is no functioning and transparent land lease system.
- Land ownership as currently registered via the Cadastre in the Immovable Property Rights Register (IPRR) is out dated and inadequate.
- There is no rural land tax, which, however unpopular, would increase the use of agricultural land and help the municipalities to finance rural development.
- Legislation related to rural lands is not consistent.
- Inter-ministerial cooperation is weak. Institutions protect their own mandates.

B3.7 Conclusions (status quo, trends and gaps regarding all three natural resources)

Forest, water resources and soil management are closely related. Sustainable forest management is critical in climate change mitigation, through supplying good-quality fresh water, securing protection from natural hazards like floods or soil erosion as well as combating desertification. One of the most important aspects of forests in relation to water resources management is their capability to reduce soil erosion. Through soil stabilization, forests minimize erosion and reduce the impairment of water quality caused by sedimentation. Forests protect the storage capacities of water bodies and the discharge capacities of watercourses by trapping sediments and pollutants from up-slope land use activities. Therefore, land administration, water and forest authorities at both the local and central levels should work together in identifying and implementing appropriate measures, aiming to improve forest coverage and halt soil degradation.

In Kosovo*, management of these three natural resources is divided at the central level between the Ministry of Agriculture, Forestry and Rural Development (MAFRD) and the Ministry of Environment and Spatial Planning (MESP), as well as between two agencies; the Kosovo* Forest Agency (KFA) and the Kosovo* Environment Protection Agency (KEPA). Water policy and management, soil and biodiversity protection are under the responsibility of the MESP while land management and land use and irrigation policies and water use in agriculture are under the MAFRD. While there is an array of institutions dealing with the same natural resources, there is always the risk that there might not be sufficient communication and flexibility towards efficient natural resource management.

However, the forest, water and soil sectors compete as well as with other sectors regarding funding and investments. Currently the most important investments in all three sectors still stem from international funds. Another important obstacle is the lack of capacities regarding the cooperation on harmonization with the EU policies. Even though the MESP staff skills have improved, in many fields the staff’s capacity is insufficient to perform complex analytical tasks required for water management or flood risk planning. External support for more complex tasks regarding good management of natural resources will be needed over the coming years. To attract well-qualified and skilled specialists at the central and local level it is recommended to improve employment conditions in the public sector.
B3.8 Recommendations for integrated management/inter sectoral cooperation of the forest, water and soil resources in Kosovo*

1. Cooperation between the water, soil and forest sectors at both national and local levels is strongly recommended for their sustainable development in Kosovo*.
2. Promotion of transboundary cooperation and integrated forest and water resources management is important.
3. Efficient and equitable sustainable management and use of forest, water and soil resources is suggested to become the main objective for natural resources to meet growing demands while adequately responding to climate change induced challenges.
4. Clarification and harmonization of the responsibilities of the different departments/agencies within the MESP, the MAFRD and local authorities to avoid overlaps and inefficiency in activities.
5. Awareness raising and education of the population on rational use of forest, water and soil resources to avoid destruction and overuse of resources.
6. Integration of data collection and management techniques related to water, forest and soil resources for the creation of one comprehensive policy for proper integrated management and inter-sector cooperation is essential.
7. Additional investment in the monitoring network of the water and soil resources and support staff especially about the ability to process, transmit and observe data in real time for flood/drought warning, water quality, monitoring of the soil quality and soil pollution.
8. Promotion of a better understanding of the interactions between, forest, water, energy and water-related ecosystems in river basins, to strengthen synergies and policy coherence between water, agriculture, energy and land management sectors.
9. Cooperation at river basin level, especially in view of the approximation process towards the EU for forest, water and soil management is needed.
10. Encouragement in the use of agricultural land, and to stimulate the land market by new tools such as imposing a land tax.
11. Approximation with the requirements of European Union legislation in all sectors is required and strongly supported.

B3.9 Recommendations concerning follow-up activities for improved national resource management in Kosovo*

One of the most important parameters for the future sustainable forest, water and land management is that of respecting their multifunctional role. Lack of clear policies and national programs, creates a situation where there is no clear vision and strategy for the development of these resources, despite favourable climate, geographical, ecological and other conditions dominated in Kosovo*.

Main recommendation of forestry sector improvement

Despite existing policy documents some high priority aspects related to forests and forestry have remained untreated, such as:

▶ Design of a platform and long-term forest program for the establishment of the sustainable and multifunctional forests and forest associated resources management.
▶ Consolidation of sustainable forest management, governance and administration structures.
▶ Completion of the forest classification by protection regime (forest codification).
▶ Promote policies that respect rights to forest use and ownership (Land tenure).
▶ Develop policies and activities that directly combat deforestation and forest degradation.
▶ Increase private sector engagement in forest management and good governance.
▶ Completion of legal framework and management structures for the implementation of EU regulations and directives as well as regional and World conventions and agreements such as: EU Timber Regulation (EUTR) and EU Forest Law Enforcement Governance and Trade (FLEGT, Habitats Directive 92/43, Birds Directive EU 79/409, Natura 2000, IUCN, UNFCCC, etc.
▶ Adaption of subsidiary schemes in the forestry sector. Sensitize and assist the farmers in applying for grants for forestry activities from the allocated funding lines for 2014 - 2020 under the EU Instrument for Pre-Accession Assistance (IPA II Programme).
▶ Complete the inventory of biodiversity and “red book”.
▶ Enhance activities for High, Vocational and Education and Training in the forestry sector.
▶ Promote transparent and efficient wood markets for sound business.
▶ Support private sector investments in the wood industry capable of benefiting from primary processing (saw milling) and downstream production.

**Main recommendations for water and soil sector**

▶ Development of river basin management plans (integrated water management).
▶ Institutional strengthening for Integrated River Basin Management (IRBM).
▶ Training and capacity building for management procedures and standards, and/or introduction or implementation of the new legal framework, in-line with the EU Water Framework Directive.
▶ Development of the observation and measurement network for water quality and quantity.
▶ Further institutional support to the MESF and the MAFRD staff for more complex tasks regarding good management of natural resources, which is needed over the coming years.
▶ Preservation of water resources and improvement of their status.
▶ Development & approval of strategic plans for emergency actions (Flood/drought risk management).
▶ Develop and increase resilience capacities of local communities and authorities to withstand a flood event, minimize damage and rapidly recover from disruptions to services.
▶ Awareness raising and significant value for conservation and integrity of aquatic and other important natural ecosystems, (habitat for rare, endemic, and endangered species; a natural shelter for biodiversity richness, migratory corridors, etc.).
▶ Development of better access for the population to water supply and sanitation.
▶ Increased revenue from water services (payment and reduction of losses).
▶ Development and construction of the water treatment facilities for urban and industrial wastewater.
▶ Promotion and development of land tenancy and agricultural land market.
▶ Promote and support of the land consolidation and land regulation.
Reference list of the data used for the assessment


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Countries;
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Assembly of Kosovo* Law on Protection from natural disasters and other disasters;
Kosovo* Green Report, 2013 (Ministry of Agriculture, Forestry and Rural Development MAFRD);
Soil Map of Kosovo* (Beak Consultants GmbH, Am St. Niclas Schacht 13 09599 Freiberg, Germany, A. Barth www.beak.de and Independent Commission for Mines and Minerals);
Assembly of Kosovo* Law on Agriculture Land;
Assembly of Kosovo* Law on Land consolidation and regulation;
MAFRD, Forest Sector Progress Report 2014 – 2015;
ANNEX B3.1
Supporting datasets

Figure 3.4 Forest cover of Kosovo* (Source: MAFRD- UNDP, "Sharr* National Park, 2013)

Figure 3.5 The forest areas covered by the new forest management plans in Kosovo* (Source: Kosovo* National Forest Inventory, 2012/13)

Figure 3.6 Kosovo* River Basins (Source: Water State Report 2015, MESP)

Figure 3.7 Map of high risk zones and regulated rivers against floods (Source: Water State Report, 2015 MESP)
Figure 3.8 Monitoring Network of surface water quality, (Source: Water State Report, 2015 MESP)

Figure 3.9 Map of quality classification, Source: KEPA/AMMK, 2010 MESP
Figure 3.10 CORINE cover land of surface waters use map, Source: KEPA /AMMK, MESP 2010
CHAPTER B4
Overview of the Natural resource management in Macedonia

Ivan Blinkov14, Makedonka Stojanovska15

B4.1 Introduction: General Information about the country

The Republic of Macedonia is situated in the central part of the Balkan Peninsula and has a very favourable geographical location. It extends between 40°50’ and 42°20’ north latitude, and 20°27’30” and 23°05’ east longitude. Very important road sections pass through the country, connecting Central and Eastern Europe with south and southeast parts of the continent and continuing towards the countries of the Near East and farther. The total area of the country is 25,713 km². The last census was conducted in 2002 and according to data from that census the Republic of Macedonia has approximately 2 million inhabitants, of which 56.7% live in urban environments and 43.3% in rural areas (Janeska and Bojnec, 2012). Since independence in 1991, the Republic of Macedonia has faced a number of economic and political challenges that have strongly influenced the national economy.

Forestry provides 0.3% - 0.5% of the GDP, but if the multifunctional uses are valorised, the contribution will be bigger. The wood industry (primary and secondary wood processing, furniture, paper industries) accounts for 2.5% - 3.0% of the GDP (Ministry of Agriculture, Forestry and Water Economy of the Republic of Macedonia, 2006). The unemployment rate in Macedonia, particularly youth and long-term unemployment, has remained persistently high, pointing to deep-rooted structural impediments in the labour market. The Republic of Macedonia – along with other Western Balkan countries – was identified as a potential candidate for EU membership during the Thessaloniki European Council summit in 2003. Macedonia signed the Stabilisation and Association Agreement in 2004, as a first country in the region. The Republic of Macedonia applied for EU membership in March 2004 and the Council decided in December 2005 to grant the country candidate status, based on the Commission’s favourable opinion. Since October 2009, the Commission has made a recommended to open accession negotiations with the country, while in 2015 the recommendation was conditioned by the defined “Urgent Reform Priorities” for the country.

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15 University St. Cyril and Methodius, Faculty of Forestry, Skopje
B4.2 Assessment of the Forest sector

B4.2.1 Forest resources and management

Forest area by management and protection regime

Table 4.1 Size of forest area by management (economic, non-economic) and protection regime (Source: Public Enterprise Macedonian Forests)

<table>
<thead>
<tr>
<th>Vegetation form</th>
<th>Available surface in [ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic</td>
</tr>
<tr>
<td>1. High forest</td>
<td>255,484</td>
</tr>
<tr>
<td>2. Coppice forest</td>
<td>546,179</td>
</tr>
<tr>
<td>1+2. All forests</td>
<td>801,663</td>
</tr>
<tr>
<td>3. Shrubs</td>
<td>18,972</td>
</tr>
<tr>
<td>4. Bare land</td>
<td>256,802</td>
</tr>
<tr>
<td>3+4. Shrubs and bare land</td>
<td>275,774</td>
</tr>
<tr>
<td>5. Other forest areas - plantations</td>
<td>14,459</td>
</tr>
<tr>
<td>FAO forest (1+2+3+5)</td>
<td>1,091,896</td>
</tr>
<tr>
<td>6. All forest and forest land</td>
<td>1,091,896</td>
</tr>
</tbody>
</table>

The total forest land in the Republic of Macedonia is 10,918 km² out of which forests constitute 835,055 (76.5%) ha or 42.5% of the whole territory, and 256,802 ha (23.52%) is not overgrown (shrubs and bare forest land). The most numerous forests (63.4%) are coppice forests and about 30.4% are high forests. The remaining 6.2% are forest plantations and other forest areas (annex – figure 4.1). The last forest census in the Republic was in 1979 and at the moment there are no public data for special purpose forests and protective forests. The complete data can be found only for the forests that are managed by the Public Enterprise Macedonian Forests (PEMF) Macedonian forests (or economic forests) and for the non-economic and protected forests only the total surface data can be found.

Growing stock, increment and felling and carbon stock

The total growing stock is around 75 million / m³ and total annual increment is about 1 million / m³. Total anticipated increment for 10 years in forest under competence of PEMF amounts to 10,948,149 m³, or annually 1,094,815 m³. (http://www.mkdsumi.com.mk/index_mkd_sumi_en.php?page=1).

Its planned exploitation amounts to 70% - 75%. The average annual increment per hectare amounts to 2.02 m³. (Table 4.2). Thus, it has to be stressed that there is a lack of disaggregated data for high and coppice forests for the growing stock and annual volume increment (annex -figure 4.2). Data about carbon stock are not available for the forests in Macedonia. Although in 2013 the Third Plan for Climate Changes in Macedonia under the GEF and UNDP financial support was produced, but there was no data on the forestry sector and carbon stock.
Table 4.2 Growing stock, increment and felling (Source: Forest Inventory 1979)

<table>
<thead>
<tr>
<th>Forest types</th>
<th>Publicly Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 m³</td>
<td>m³/ha</td>
<td>000 m³</td>
</tr>
<tr>
<td>Growing Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>255.484</td>
<td></td>
<td>255.484</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>546.179</td>
<td></td>
<td>546.179</td>
</tr>
<tr>
<td>Total</td>
<td>68592.167</td>
<td>84.0</td>
<td>5750.955</td>
</tr>
</tbody>
</table>

| Forest types     |                |                 |               |
| Total annual volume increment |                |                 |               |
| High forests     | 1675.491       | 2.05            | 153.539       | 1.72            |
| Coppice forests  |                 |                 |               |
| Total            | 1675.491       | 2.05            | 153.539       | 1.72            |

Forest types and ownership by management regime

According to the new Law on Forests (2009) there are only two types of ownership: public and private. The forests on public ownership are managed by PEMF, except for forests within protected areas which are managed by the Public Institutions for Protected Areas. Private forests are also managed by the PE because they need to have issued to them a permit from the PE for any activity undertaken in their forest, due to the fact that private forest owners do not have management plans for their forests. Out of the total area of the forest, state owned forests comprise 89.1%, while their part of the total wood mass is 92.2%. Private owned forests comprise 10.9% (State Statistical Office the Republic of Macedonia, 2015). The private forests are small scaled and fragmented. The average size of the private forests is 0.6 ha. (Trendafilov et al 2008).

The main tree species per areas in the forests in Macedonia are, oak (30%), beech (23%), black pine (0.85%) and fir (0.65%).

Table 4.3 Main tree species according to public and private forests

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
</tr>
<tr>
<td>Oak</td>
<td>258,272</td>
<td>49,786</td>
<td>308,058</td>
</tr>
<tr>
<td>Beech</td>
<td>209,055</td>
<td>23,188</td>
<td>232,243</td>
</tr>
<tr>
<td>Black pine</td>
<td>40,029</td>
<td>5,331</td>
<td>45,360</td>
</tr>
<tr>
<td>Scots alba</td>
<td>7,473</td>
<td>986</td>
<td>8,459</td>
</tr>
<tr>
<td>Fir</td>
<td>5,699</td>
<td>148</td>
<td>5,847</td>
</tr>
</tbody>
</table>

B4.2.2 Forests in support of rural communities

In the Republic of Macedonia the annual fire wood demand, as mentioned above, is around 800,000 m³ and the demand is mostly satisfied with the production of firewood from the forests in state and private property. The wood industry processes around 100,000 – 120,000 m³ which comes from the forests, but due to the deficit in resources that Macedonia has in industrial wood from coniferous tree species, the import of wood is much greater than the production in Macedonia.

The production of firewood and technical wood requires engagement of manpower for logging, supplying and transporting and revenues covering their income. Most of these people are residents of villages in the mountainous regions. Other economic potential for the rural communities related to forest products,
include herbs, fruits, mushrooms and game. Each year part of the population collects forest products and uses them for self-subsistence or sells them on the market. Some 50 species of mushrooms are collected, and the annual export amounts to around 320 tonnes, equalling a value of about 1.9 million euros. In regard to herbal / medicinal spices, annually about 1,100 tons, with a value of approximately 1.3 million euros are exported. Purchase and export are done by several companies (Alkaloid Bilka, Jaka, Coro and among others).

Among wild fruits, blueberry is notable. In addition, wild apple, pear, cherry, and sour cherry are requested as additives in fruit teas. (Strategy for Biodiversity of the Republic of Macedonia). On the other hand, village and mountain tourism is of increasing importance for the development of rural areas. People living near forest areas have the opportunity to take advantage of this type of tourism through the provision of services to tourists who want to stay in the woods.

Public forests and public forest companies

The Public Enterprise, Macedonian Forest, began to operate on 1.07.1998 as a legal successor to the already existing thirty independent forest enterprises. Management of the public enterprise was established and regulated according to Article 17 of the Law on Forests and by the law on public enterprises, forest law, law on trade companies, accounting law and other relevant laws and regulations. Relations in the public enterprise are regulated by the statute and inner general acts of the enterprise and its responsibility is to manage state forests that have commercial and protective character (Article 87).

Employment in the forest sector

The Public Enterprise, Macedonian Forests (PEMF) employs a total of 2,232 employees. According to their qualifications, the staff consist of two PhD holders; 15 with a master’s degree: 410 with a bachelor’s degree (mainly forestry engineers); 74 with two years of college; 1,140 with a high-school certificate (mainly forestry technicians); and 591 with primary school education (forestry workers) (PE Macedonian Forests, 2016).

Despite its low contribution to the national GDP, forestry and forest industry play an important role in the national economy especially in the rural areas, because they provide employment for the rural population. According to official statistics, about 7,000 people are directly employed in forestry and the forest industry sector. Indirectly, the sector provides job opportunities (part-time jobs) to an additional 35,000 – 40,000 people through multiplier effects. Tens of thousands of people rely on the forest industry for a living. The public enterprise signs contracts with more than 200 small enterprises for services like logging, transport of the wood assortments which means that it strengthens the enterprises. Also, all produced sawn wood goes to the small enterprises which means that they are not calculated as employed in the forestry sector and they are indirectly supporting these employees. As 40% of the population lives in rural areas, and since a high proportion of these people are unemployed, forestry is likely to be of particular importance in raising living standards in rural areas (tourism, non-wood forest products etc.)

B4.2.3 Fostering competitiveness of the forest sector and added-value chains

Public enterprises are the main component of the public sector, with mixed-enterprises (based on state ownership and private) and controlled in a more or less by public authorities. (Maican, 2013) Thus, the Public Enterprise which is managing state owned forest in Macedonia somehow has the exclusive monopoly rights which are granted for various reasons of public interest (clean water, soil, and air). These exclusive rights can impede the creation of a genuine internal market in these sectors, as is the case in the country. It means that they are the main competitor in the wood market in the country. But, they do not produce chips, bricketts, and pellets; instead, they just sell fuel wood and industrial wood. Private forest owners have recently started to show an interest in their assets, but in most cases they only satisfy their internal needs from the forests; they do not sell and they are significant competitors within the market (Stojanovska, 2012). Maybe that is the reason why this enterprise is not interested in the value added chain. The forestry sector in the country should immediately begin changes in this direction, due to the fact that there are a lot of possibilities that can be used for competitiveness and added-value chain.
Forest products and services

According to the statistical data for export – import for 2004, the import of wood products is greater by 50 million euros than that of exports. The biggest part of the import comes from plywood, coniferous lumber, carpentry and parquet. Part of the deficit of domestic products which are covered by imports is due to the closure of former production facilities from the forest industry, and part is due to the deficit in resources that Macedonia has in technical wood from coniferous tree species. Only 4 - 5% of forests are pure coniferous plantations and 4 - 5% is the participation of conifers in mixed plantations.

It is very hard to find quantities for non-wood forest products, because the Statistical Review presents data for every non-wood forest product separately and it is very hard to make analyses. That is an issue that should be improved in order to have real data which can also help or motivate the rural population to be more active in that area. Services that come from the forests are not evaluated in the country.

Contribution of the forest sector to GDP

Forestry in the Republic of Macedonia is an economic branch that contributes between 0.3% and 0.5% to the GDP. Although, if multifunctional uses of the forests were be valorised, the contribution of forests to the GDP of the country would be considerably higher. The share of the forest industry (primary and secondary wood processing, furniture, paper and pulp) to the GDP is estimated to be between 2.5% and 3%. These data can be gathered from some internal reports of relevant enterprises or institutions.

Illegal logging

In total, the volume of illegally logged wood in the Republic of Macedonia presumably ranges from 25% to 30% (mostly fuel wood – more than 40%)16. Concerning the combat against illegal logging, cooperation between the forest police and the police from the Ministry of Internal Affairs is in place. The police authorities responsible for the suppression of all illegal activities in the country, including forest activities, take action against perpetrators together with the forestry police. However the low number of police workers, lack of material equipment, and insufficient professional capacity seemingly impedes efficient combat against illegal logging. The institutional capacities for prevention of illegal logging inside the institutions are insufficient.

The main reasons for illegal logging in the Republic of Macedonia are unfavourable social and economic conditions, insufficient numbers of forestry police, and inefficient administration of the justice department. There is also a difference in the cost of the logged wood when obtained by illegal means, as it is sold at a cheaper price. Facing these problems, the term “sustainable management” was included in the Strategy for Sustainable Development of Forestry and in the Law on Forests.

B4.2.4 Protection of forests and enhancing ecosystem services

Forest health and damages

One of the most detrimental factors for forests and nature in the Republic of Macedonia is forest fires. The main reasons for forest fires are:

- pyromania, which is very rare in the country; and
- economic motivation, mainly due to illegal logging.

There have been some cases of fires being started intentionally in order to ‘cover’ illegal logging activities carried out previously (Nemeth 2015). In the period from 2010 - 2015 most of the forest damages were human (114,157 m³). Insects, in contrast, caused the least forest damage (4,758 m³). There were no registered damages by plants during this period.

16 Forest Fire Country Study
Table 4.4 Forest damages in Macedonia in the last five years (2011 – 2015)

<table>
<thead>
<tr>
<th>Types of forest damages</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Total for the period 2011-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1000 m³ or ha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human made (m³)</td>
<td>11,557</td>
<td>25,189</td>
<td>26,239</td>
<td>25,942</td>
<td>25,230</td>
<td>114,157</td>
</tr>
<tr>
<td>Damages by insects (m³)</td>
<td>3,513</td>
<td>327</td>
<td>/</td>
<td>300</td>
<td>618</td>
<td>4,758</td>
</tr>
<tr>
<td>Natural disasters (m³)</td>
<td>1,743</td>
<td>2,211</td>
<td>20,584</td>
<td>870</td>
<td>1,063</td>
<td>26,471</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>Damages by forest fires (ha)</td>
<td>3,283</td>
<td>8,702</td>
<td>19,312</td>
<td>2,844</td>
<td>1,150</td>
<td>35,291</td>
</tr>
<tr>
<td>Other (define)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Biodiversity conservation and management

The system of protected areas according to the Law on Nature and the International Union for Conservation of Nature (IUCN) categorization, consists of protected areas and areas proposed for protection. It was established for the protection of biodiversity within natural habitats, abiotic and landscape diversity. Protected areas include natural habitats, ecosystems, and natural geological and geographical formations characteristic of the territory. There are total 86 protected items that cover 230,083 ha. [http://www.oecd-ilibrary.org/docserver/download/4308081ec007.pdf?expires=1475157427&id=id&accname=guest&checksum=B2C3E0140E4B8BCFDF25A69462A2E94D]

Forest certification in the Republic of Macedonia

Forests in Macedonia are not certified yet. Thus, with the demand for sustainable forest management growing in the Balkans, the 2014 Programme for the Endorsement of Forest Certification (PEFC) Collaboration Fund is supporting a project in Macedonia to begin the development of a national forest certification system for the country.

Following on from an initial outreach project carried out in the Southwest Balkans, the 2014 PEFC Collaboration Fund is now supporting a follow-on project to guide Macedonia through the system development process, up to their application to PEFC for the endorsement of their national system. A key aspect of this project is building consensus on the criteria and indicators for sustainable forest management among the various stakeholders in the country. Using stakeholder mapping to ensure the participation of all relevant stakeholders, a working group has been created to develop the national standard. Once finalized, this standard will go through a public consultation and a pilot test to ensure it meets expectations [http://www.pefc.org/projects/forest/macedonian-national-system].

B4.2.5 Institutional set-up of the forest sector, legal and policy governance

Organization of the forest sector

The Government of the Republic of Macedonia administers the forests and forest lands in state ownership through the following institutions:

▶ The State Inspectorate of Forestry and Hunting, as a body within the MAFWE, controls and supervises the enforcement of the Law on Forests, the Law on Hunting and all other laws and legally binding acts in the field of forestry and hunting. The Forestry Police, as a sector within the MAFWE, protects the forests in accordance with the Law on Forests.
▶ Public Enterprise Macedonian Forests (PEMF) www.mkdsumi.com.mk. The public enterprise for managing state forests, as the legal successor to the former enterprises for forest management has
the following core activities: silviculture, protection and utilisation of forests through the restoration, nurture, protection, afforestation and utilisation of forests and forest land, and other activities for the maintenance and improvement of forest functions.

▶ Saints Cyril and Methodius University of Skopje, Faculty of Forestry www.sf.ukim.edu.mk. The Faculty of Forestry in Skopje was established in 1947. Today, the faculty offers three undergraduate academic programmes, 10 postgraduate academic programmes, and doctoral studies with a tutoring system. The main mission of the faculty is the education and the establishment of a highly educated and scientific staff in the field of forestry, landscape design, eco-engineering and eco-management. There are 4 forestry secondary schools located in Kavadarci, Skopje and Demir Hisar and in Tetovo. The secondary schools produce forest and landscape technicians and the Faculty has three types of engineers: foresters, landscape architects and eco-engineers.

▶ The Ministry of Environment and Physical Planning www.moepp.gov.mk. In the framework of efforts towards integration into the modern trends of environmental protection in Europe and beyond, and as an important aspect of the reform process, the Macedonian Government established the Ministry of Environment (Law on the Amendment to and Supplemetalting the Law on Public Administration Bodies, Official Gazette of RM No. 63/98). Article 122 of the above law defines the competences of the ministry, among which those closely related to forests and the forestry sector are: monitoring of the state of the environment; protection against noise and radiation; the conservation of biological diversity; the conservation of geological diversity, national parks and protected areas; and the supervision of inspection in fields within its scope. Operating within the Ministry of Environment and Physical Planning is the State Inspectorate for the Protection of the Environment, which is competent for the control of all legal and physical entities in the field of environmental protection.

▶ Private forest owners www.naps.com.mk. The National Society of Private Forest Owners (Nacionalno Zdruzenje na Sopstvenici na Privatni Sumi) was founded in 1997, although its current name was only adopted in 2010 (Official Gazette of FYRM No. 52 of April 16, 2010). It is a non-governmental and non-political organisation, the main mission of which is the “protection of the individual and common interests of private forest owners without affecting the principles of sustainable forest management”. The society currently has a membership of around 6,000. Special purpose forests subject to the forest functions (production, protection and useful functions) as well as the forest management measures. The forests are divided into commercial forests, protective forests, special purpose forests and forests in protected areas.

Legal framework for forest policy

Forest Law

In the present forest law, (Official Gazette of RM, No 64/2009) it is stipulated that forests in Macedonia are in state and private ownership (Article 2). This means that there should not be any differences between the treatments of state or private forests, but unfortunately that is not the case in practice. Forest inventory is envisaged to be done with this law (article 25), this is essential to sustainable forest management, for the reason that Macedonia has done its last inventory of forests in 1979, so in order to have proper and sustainable management, the first thing to be done is a forest inventory, then comes planning and management of forest resources. Also introducing of forest and forest land cadastre is a new regulation that will contribute to improvement of the forestry sector as a whole, and relations between different owner groups (state, private, municipal, churches) (Article 77). Availability of data in forestry (management plans, inventory data, cadastre documents) with the new law are publicly available, so any interested party can obtain these documents for a certain fee, paid to the original owner of the data (Article 40). New information systems will be introduced in forestry in order to connect all relevant parties in this sector into one network where all the data will be kept. This is one step towards opening up this this traditional sector and making it more democratic. By doing so, the public will have access to the data about state of forestry at a certain moment meaning that transparency will be increased (Article 78). Involvement of public and all interested parties in decision-making processes in forestry is also stipulated with this law (Article 38). This is first time that a forest law has recognized the role of other stakeholders in the decision-making processes.

Strategy for sustainable development of forestry
The Strategy for sustainable development of forestry was established in 2006. It has a vision for the forestry sector that predicts that forest covered areas will increase, through afforestation of bare lands with quality plants, mainly of domestic species. Care and protection of artificial stands will be prompt and appropriate, providing quality forests, both biologically and economically. Non-wood forest product management will create significant economic benefits for the forestry sector and the state, and will be appropriately legislated. Contemporary infrastructure and facilities for collecting, processing and packaging will secure competitiveness of the products on European markets. Macedonia will be a popular destination for recreation, sport, eco-tourism and commercial hunting tourism, enabling significant foreign currency income. Besides the renowned tourist centres, a large portion of the activities and destinations will be directed to forest areas managed by the forestry sector.

**Environmental legislative**

As regards the environment, in the area of horizontal legislation the national environmental strategy has not yet been adopted. Administrative capacity for implementing the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) Directives was improved, but remains insufficient, notably at the local level. A coordination body has been set up for cooperation and dialogue with the civil society. ([http://www.env-net.org/environmental-acquis/approximation-env-net-countries/republic-of-macedonia/](http://www.env-net.org/environmental-acquis/approximation-env-net-countries/republic-of-macedonia/)). The policy on environmental protection is based on the Law on Environment and Nature Protection and Promotion (see item 2.1 of the Regulatory System). The Republic of Macedonia is actively included in the ministerial process, “Environment for Europe”. As part of this process, the Government has prepared and adopted the National Environmental Action Plan (NEAP), as a main strategy for environmental protection. The Republic of Macedonia has accessed the Convention on Biodiversity with the adoption of the Law on Ratification (Official Gazette of the Republic of Macedonia no. 54/97). The Law entered into force on 2 March 1998. The Ministry of Environment and Physical Planning, in cooperation with the other competent bodies in the country, is the responsible body for the implementation of the Convention in the Republic of Macedonia. The Republic of Macedonia signed the Cartagena Protocol on 26 July 2000, and started the procedure on its ratification. The National Strategy and Action Plan on biodiversity conservation and sustainable use (NBSAP) was adopted in January 2004. Law on Nature Protection represents a core law or lex generalis relating to the other nature protection laws defined as special laws or lex specialis. Furthermore, the Law on Nature Protection is followed by the Law on Environment, which represents the second level Laws of related legislation. And the third level of nature protection related legislation are Laws dealing with parts of nature such as Law on Forests, Law on Waters, Law on Pastures, and Law on Protecting Plants, etc.

**Implementation & approximation of EU law**

Political and economic changes in the country in accordance with the EU integration processes require prioritising and focusing on the multifunctional use of forests and their management, integrating much wider aspects where protection, biodiversity and the care of nature and the environment are placed first. Macedonia has accepted them and introduced them into the forest policy documents. The main problem is the implementation phase.

The country’s current biodiversity legislation is in the process of approximation with the EU legislation. While approximation of the EU Habitats and Birds Directives will be a major step forward, further steps are necessary to address all of the country’s responsibilities under the Convention on Biological Diversity (e.g. bio safety). The weight in the process is to seek and achieve the maximum possible synergy between development of the National Biodiversity Strategy and that of the Second National Environmental Action Plan and the National Strategy for Sustainable Development. EU approximation, and the Pan European Biological and Landscape Diversity Strategy (under the Ministerial ‘Environment for Europe’ process, (Ministry of Agriculture, Forestry and Water Economy of the Republic of Macedonia, 2007). The Bird and Habitat Directives (2000) are ratified by Macedonia and they are part of the Law on nature protection. At the moment the process has been started for NATURA 2000.

**Rural Development Regulation /IPARD**

The aim of the Instrument for Pre-Accession Assistance (IPA) is to enhance the efficiency and coherence of
aid by means of a single framework in order to strengthen institutional capacity, cross-border cooperation, economic and social development and rural development. The Republic of Macedonia is one of the three countries which benefited from the use of IPARD 1 (the others being Turkey and Croatia). The national IPARD 1 Programme for 2007 - 2013 was approved by the European Commission in 2007, with the total indicative budget of 87.53 million euros. In 2009, funding was authorized for the three measures:

- investments in agricultural holdings;
- investments in the processing and marketing of agriculture and fishery products;
- diversification and development of rural economic activities.

Since 2009, the government has issued nine public calls for application to use IPARD funds. To date, about 18% of remaining IPARD 1 budget has been committed to finance about 300 projects.

The Ministry of Agriculture, Forestry and Water Economy has prepared the IPARD 2 programme for 2014 - 2020, which will have the same scope as IPARD 1, plus forestry and advisory services. For 2014 European Commission (EC) allocated a grant of 106 million euros for the development of agriculture in the rural communities in Macedonia. However, economically we still need direct activities which will produce jobs to keep the people in villages. These jobs should be directly connected with food processing from agriculture and forest products and rural tourism. Our focus and our plan to work towards the solution to the problems of food production and rural development, is on one side and to also focus on private sector promotion, local entrepreneurs, loans, and energy efficiency, as the other side of the activities.

**EU Timber Regulation**

This regulation is in its initial phase. It is mentioned together with the debate for certification of the forests, thus it cannot be said that Macedonia is following these requirements as yet.

There are other directives that are transposed within national legislation, too. The membership in the World Trade Organisation is preconditioned by the harmonization of the sanitary and phytosanitary measures with the international standards. This prescribes supplementing and amending the respective laws and procedures on harmonization with the international conventions applied in the 7 National Biosafety Frameworks for the Republic of Macedonia field of veterinary protection (OIE - Office International des'Epizooties), phytosanitary systems (International Convention on Plant Protection) and safety of food (the Alimentarius Codex).

**B4.2.6 Forest knowledge base**

*State of forest inventories*

As was mentioned above, Macedonia should perform a forest inventory, due to the fact that the last one was conducted in 1979. It could then be used as a solid base for further sustainable development of forestry as an economic branch.

**B4.3. Assessment of the water sector**

**B4.3.1 Water resources and policy in the country**

*Physical Framework*

The Republic of Macedonia is a land-locked country surrounded by Bulgaria to the east, Serbia and Kosovo* to the north, Albania to the west, and Greece to the south, with a border length of 850 km. Large and high mountainous massifs characterize the country’s topography with an average elevation of 829.70 m above sea level. Only 25% of the territory is characterized by valley and valley-hilly relief. The mean slope is 15.1° (33.56%), and almost 75% of the territory is characterized by slopes >10%. The country has 14 mountain peaks higher than 2,000 m. The highest peak, the 2,764 metre-high Golem Korab is situated on the Albanian border. The lowest point of the country (40 m above sea level) is situated on the border
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with Greece. Mountain relief with very steep slopes dominates in the western part of the country. A wide variety of relief types exist in Macedonia. Generally, uneven relief with steep slopes and much diversified landscapes are characteristics of the country. The territory of Macedonia generally belongs to two regions: the Rodopian region of ancient mountains and ravines in eastern part and region of young (recent) mountains and ravines located in western and central part of the country. The country territory is divided into four geotectonic regions: the Serbian-Macedonian massif, the Povardarie area, the Pelagonia massif and the Western Macedonia zone. Although very heterogeneous the mountainous region is generally composed of compact (solid) rocks which are of eruptive or metamorphic origin. The valleys consist mainly of clastic mechanical sediments which are usually loose or weakly connected. Only a very small part of the valleys consists of recent compact stones (vulcanite).

B4.3.2 River basin management

Water resources

The total water resources of the Republic of Macedonia are estimated at 6.37 billion m$^3$ in a normal year and 4.80 billion m$^3$ in a dry year, out of which 72.19% are carried in the Vardar basin, 25.74% in Crn Drim basin and 2.07% in Strumica basin. In the Republic of Macedonia there are 4,414 springs with a total yield of 991,9 million m$^3$/year, of which 58 have a capacity of over 100 l/s. Three natural lakes, Ohrid (358 km$^2$, Macedonian part 229.9 km$^2$ and with a maximum depth of 285 m), Prespa (274 km$^2$, Macedonian part 176.8 km$^2$ and with a maximum depth of 54 m) and Dojran (43 km$^2$, Macedonian part 27.4 km$^2$ and 10 m in depth) have also great significance for the hydrographic characteristics of the Republic of Macedonia. There are also 25 small lakes that are of glacial origin situated in the highest parts of the mountains. There are 22 larger dams and reservoirs and over 100 smaller reservoirs. The total annual precipitation on the territory is 19.5 x 10$^9$ m$^3$, with the external inflow being 1,014 x 10$^9$ m$^3$. The total actual outflow is 6,322 x 10$^9$ m$^3$. In the last 10 years (2004 - 2013), total mean annual discharge of rivers outflowing from Macedonia has varied from 55 m$^3$/s (2007) up to 160 m$^3$/s (2010). There are 44 wetlands (including lakes) in the country, having an area of 57,422 ha or 2.23 % of the total area of Macedonia. Groundwater on the territory of the Republic of Macedonia is generally divided into two kinds of lithological formations: Quaternary and Neogene formations, with characteristic intergranular porosity and carbonate formations with karst porosity. Karst formations with porosity have only a minor importance with regard to water distribution.

<table>
<thead>
<tr>
<th>Table 4.5 Freshwater abstraction and water use, in million m$^3$ (Source: <a href="http://data.trendeconomy.com/eurostat/env_wat_abs/MK">http://data.trendeconomy.com/eurostat/env_wat_abs/MK</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Fresh surface water abstracted</td>
</tr>
<tr>
<td>fresh groundwater abstracted</td>
</tr>
<tr>
<td>Total freshwater abstraction</td>
</tr>
<tr>
<td>Total water use</td>
</tr>
</tbody>
</table>

River basins and topography

The hydrographic territory of the Republic of Macedonia is divided into four river basins: Vardar, Strumica, Crn Drim and Juzna Morava (annex - figure 3a). The Vardar river basin is the largest (20,546 km$^2$ or 79.9%) and gravitates towards the Aegean Sea. The Strumica river basin is located in the southeast part of the country (1,520 km$^2$ or 5.9%), and is a tributary of the River Struma in Bulgaria, and this also gravitates towards Aegean Sea. The Crn Drim river basin is located in the west of the country (3,355 km$^2$ or 13%) and gravitates towards the Adriatic Sea. Juzna (South) Morava river basin is in the north of the country, and is the smallest one (44 km$^2$ or 0.2%) and gravitates towards the Black Sea. The surface inflowing waters are the rivers: Lepenac, Pcinja and Elaska and the outflowing waters are rivers Vardar, Strumica, Crn Drim, Curonska, and Lebnica (annex - figure 4.3b). The mean annual sum of precipitation are as follows: in the Vardar river basin 700 mm; in the Strumica river basin 790 mm; and in the Crn Drim river basin 980 mm. The Republic of Macedonia is divided into 16 water management divisions (annex - figure 4.4). There are 11 water management divisions in the Vardar River basin, 4 in the Crn Drim River Basin and 1 in Strumica River Basin. A small area of the Binachka Morava River Basin is included in the water divisions Pcinja and
Skopsko.

River basin management plan and implementation

Up to now only one river basin management plan for the Lake Prespa watershed, that is a sub-basin of the River Black Drim, is being prepared and implemented. Furthermore, the plan has been updated in 2017.

The Plan for the Strumica River Basin and Plan for Bregalnica River (a sub-basin of the River Vardar) has been also finalized.

The plan for the Vardar River Basin is under preparation.

The preparation of the plan for Ohrid Lake watershed is planned to start by the end of 2017.

B4.3.3 Flood management

Mountain hazard related to water (torrents, landslides)

Exactly 1,539 torrents are registered in Macedonia (Gjorgjevic et al, 1993). Mudflow and debris flows are typical for these types of torrents. Landslides and rock falls generally occur in the several main engineering geological zones susceptible to different types of slope failure. More than one hundred larger landslides exist, with specific conditions and influences on surrounding media (annex - figure 4.3). A normal consequence of these events, besides flooding of the area and subsequent damage, is the huge quantity of sediments deposited in the downstream sections, including even large boulders/rocks with a volume of up to 30 m³. These torrents have caused enormous damage and loss to the Macedonian economy. Beside this significant, a number of people have died as a consequence of torrent flash floods.

History of floods and consequences

Floods in Macedonia are the dominant natural hazard (annex - figures 6 and 7). The key natural factor increasing the flood risk, besides topographic and land characteristics, and a relatively dense hydrographic network in the most affected regions, is heavy precipitation. In addition, the changes in the land-use/land cover structure further modify hydrological regimes, increasing the risk of extreme hydrological events. Additional causes of the growing flooding risk include:

- reduced conveyance in relation to the discharge capacity of the existing regulated river sections (e.g., because of poor maintenance of existing river regulations, conversion of floodplains/river corridors etc.);
- old and poorly maintained hydraulics and/or flood control infrastructures (e.g. drainage systems, embankments and levees); and
- operating regimes of existing multi-purpose dams and reservoirs are not properly optimized to enable better flood risk mitigation. Agricultural land, extending dominantly along rivers, is the affected by floods.

In the following table the major flood events (>10 million euros damages) are presented.

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected municipalities</th>
<th>Losses and damages million euros</th>
<th>Affected population</th>
<th>Fatalities</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2003</td>
<td>4</td>
<td></td>
<td>3</td>
<td>River</td>
<td></td>
</tr>
<tr>
<td>June 2004</td>
<td>26</td>
<td>15</td>
<td>100,000</td>
<td>0</td>
<td>R+T</td>
</tr>
<tr>
<td>February 2013</td>
<td>7</td>
<td>10,000</td>
<td>1</td>
<td>R+T</td>
<td></td>
</tr>
<tr>
<td>Jan. – Feb.2015</td>
<td>43</td>
<td>35.7</td>
<td>170,000</td>
<td>0</td>
<td>River</td>
</tr>
<tr>
<td>August 2015</td>
<td>3</td>
<td>25</td>
<td>10,000</td>
<td>6</td>
<td>Torrent</td>
</tr>
<tr>
<td>August 2016</td>
<td>10</td>
<td>Still not estimated</td>
<td>450,000 (20,000)</td>
<td>22</td>
<td>Torrent</td>
</tr>
</tbody>
</table>
The number and intensity of floods in the country is rising. During the last three decades regional floods caused by the biggest rivers in Macedonia have usually happened in the colder part of the year (November – February). River floods are caused by long periods of rains and intensive snowmelt or a combination of both. Beside them, there are very frequent flash floods caused by short and intense rains (most frequently summer storms) in smaller basins, especially mountain torrents. Due to the geomorphology and climate, the Republic of Macedonia is very liable to both, river (regional) and torrential (local flash) floods. Almost all rivers cause floods and over 102,000 ha could be flooded, considering the 100 year return period. Rural areas were dominantly affected during the floods.

**Flood risk management plan**

Up to now, there has been no prepared preliminary flood risk assessment, or flood hazard and flood risk maps as well as flood management plan according to the flood directive (FD). The first flood management plan according to the FD is in preparation (for the Strumica river basin). There are documents and plans prepared according to older national legislation and each bigger municipality has already prepared plans regarding the protection from floods.

**Flood protection**

One of main flood protection schemes was built on the River Vardar in Skopje that dates back to after the big floods of 1895 and 1897. The 1950s and 1960s marked the construction of large hydro irrigation schemes. Overall, outstanding regulation works have also been undertaken on the rivers Treska, Pcinja, Bregalnica, Crna Reka and Crn Drim. Large systems for flood control have been built for the regions of Skopje, Pelagonija, Strumica and Struga. There are 32.7 km of trained rivers in the Skopje region, 82.3 km in Pelagonija, 79.3 km in the Strumica region, and 10.9 km in the Struga region. Recently in the Skopje region the dam Kozjak for flood protection was built, with a retention volume of 100 million m³. Flood protection schemes are generally constructed in combination with irrigation and/or drainage systems. Generally for these projects, the acceptable level of risk is a probability of 5% for agricultural areas, 2% for rural settlements and 1% for urban areas. Rivers in Macedonia are morphologically altered due to flood and erosion protection measures. Rivers are regulated (mainly functional regulation, not restoration) especially in the regions of Skopsko, Pelagonija, Strumica and Struga. Significant physical changes are recognized at the rivers Vardar, Treska, Crna Reka, Strumica and Crn Drim. Numerous regulations are constructed in contrast to good practice (i.e. recent regulations at the Vardar’s tributaries, Doshnica and Boshavica, close to Demir Kapija) and cause significant negative environmental impacts like loss of connection between surface water and groundwater due to river bed reinforcement, loss of in-channel habitats and significant changes to erosion and sediment deposition in the surrounding channel as a result of channel straightening, loss of floodplain wetlands and associated biodiversity from the construction of embankments, increased inputs of fine sediments due to farm run-off or loss of bankside vegetation. (Popovska et al, 2012).

Measures to control torrents were initiated in the early 1900’s, aimed mostly at protecting rivers and reservoirs. About 65% of designed hydraulic structures within the designs were built, but only 25% of planned afforestation were realized in the period 1945 – 2014, more than 200,000 ha of bare lands are afforested. The percentage of success is not known up to now, but it is estimated to be close to 70%. (Blinkov and Trendafilov, 2005).

The provisions regulating flood management in Macedonia are comprised of several sector laws focusing on various aspects related to flood management. The system is encompassing elements of prevention of damage caused by floods, protection by taking measures to reduce the likelihood of floods, information system about flood risks and in event of a flood, as well as emergency response and mitigation of the impacts on the affected population. Generally, flood management at the moment is not satisfactory. Institutional set-up is also poor.

**B4.3.4 Water quality**

*Classification of the ecological state of water bodies*

Through the project “EuropeAid/132108/D/SER/MK – Technical assistance for strengthening the
institutional capacities for approximation and implementation of environmental legislation in the area of water management”, following the Pfafstetter methodology and coding system the “segments” of the rivers in Macedonia (Strumica 61, Black Drim 141, Vardar 1117 segments/sub-basins) were delineated (annex - figure 4.5). Through the same project the basis of the national Water Information System in Macedonia was established. Ecological status of surface bodies in Macedonia hasn’t been defined yet. There are full and relevant data available only from prepared river basin management plans: Prespa lake sub-basin, Bregalnica sub-basin and Strumica basin where the classification of the ecological status is been done according to the WFD methodology.

**A map of the monitoring network**

The only official monitoring network for water quality is the River Monitoring Network called RYMSIS. Monitoring is not fully organized according to WFD needs. There are partial, temporarily realized monitoring activities during some projects, according to WFD needs. For Lake Prespa monitoring of the lake according to WFD principles has been established.

**Surface water (ecological and chemical status)**

There are no sufficient and appropriate data on the ecological status according to the WFD needs except from some projects. Observation and examination of surface water have been performed according to old national legislation. Part of the data is presented in the annex - figure 4.11.

**Groundwater (chemical and quantitative status)**

There are no sufficient and appropriate data on groundwater yields, quantities or quality. Observation and examination of groundwater have not been performed systematically and continuously, except for some projects. There is a map of the vulnerability of groundwater (annex - figure 4.10).

**Waste water treatment and reuse**

Almost half of dwellings are not equipped with installations to connect to the public sewage system. Generally, the systems are rather old, worn out, with the collecting network constructed of different materials, the pipes cracked and there is leakage of wastewater into the ground. There is also a very small number of wastewater treatment plants in the Republic of Macedonia and this situation should be improved in the future. Besides wastewater, important polluters are the industry and agriculture (large farms, pesticides, fertilizers). Although countrywide 80% of the population has access to wastewater collection, only 10% of the sewage is currently being treated. Most of the wastewater is being discharged directly into rivers and lakes (Ministry of Environment and Physical Planning, 2011).

**B4.3.5 Water demand**

The major water users are agriculture, industry, the population (drinking water supply) and energy production.

<table>
<thead>
<tr>
<th>Sector</th>
<th>Millions of m³</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water supply of municipalities</td>
<td>214</td>
<td>11.6</td>
</tr>
<tr>
<td>Irrigation</td>
<td>1,155</td>
<td>62.6</td>
</tr>
<tr>
<td>Industry</td>
<td>274</td>
<td>14.8</td>
</tr>
<tr>
<td>Fish ponds</td>
<td>202</td>
<td>11.0</td>
</tr>
<tr>
<td>Total</td>
<td>1,846</td>
<td>100</td>
</tr>
</tbody>
</table>

According to the total water demands by user (including environmental flow), currently the major water consumer is the irrigation sector with 44%, environmental flows with 31%, industry with 14%, and drinking
Almost 88.9% of the total number of individual households is supplied with drinking water from the public water pipeline (annex - figure 12). The percentage of safe samples in the years 2010 - 2014 is over 90% (91.5% - 95%), which indicates that the sanitary-hygienic condition of the drinking water is within the limits of the expected quality. The percentage of unsafe samples, according to the physical-chemical analysis, ranges from 2.6% to 5.6%, and the percentage of unsafe samples, according to microbiological analysis, ranges from 0.8% to 3.0%.

Water scarcity and droughts

The country is under the influence of several climate types, including continental, changed continental, sub-Mediterranean (changed maritime) to mountainous climate with various sub-types. The average precipitation sum varies from <500 mm in the central part of the country up to 1,400 mm in the western part of the country. The mean annual temperature in the country varies from 6°C in the high mountain region in the western part, up to 14.7°C in the southern part of the country. According to the Aridity Index (AI), in significant parts of the country AI is below or around 0.65, which is significant for vulnerability to the desertification process (annex - figure 4.15). It is clear that in most areas in the country evapotranspiration is higher than rainfall. Moreover, not all rainfalls are efficient. The annual water deficits are not so large, and reach a maximum of 400 mm and in all areas in the country some plant species may survive. The temperature regime in the country does not allow vegetation growth during winter and there are periods when plants can grow and develop, usually assumed to be from April – September. The water deficit during this period is much higher than the annual average and reaches up to 700 mm. Also, a much bigger portion of the country’s territory is affected by a shortage of water for normal growth of vegetation; therefore biomass production in the country is highly limited by water deficit especially having in mind the water retention capacities of most of Macedonian soils. Several national documents refer to measures for the mitigation of effects of water scarcity and drought. (Ministry of Environment and Physical Planning, 2017).

Irrigations

The arable agricultural area in the Republic of Macedonia occupies approximately 667,000 ha. If fully constructed, irrigation schemes could irrigate around 400,000 ha, or 60% of the total arable land. So far, 106 smaller and larger irrigation schemes have been built covering an area of 163,693 ha of fertile arable land, i.e. 49.9% of the area that may be irrigated. The actual possible area for irrigation is about 126,600 ha (annex - figure 4.13). The irrigation schemes were mainly constructed during the period 1958 - 1980, which means that some of them have been in service for more than 40 years. Out of the total area under irrigation, 61% is irrigated by sprinkling, while 39% by other types of surface irrigation. The total annual irrigation water demand is at least 900 x 10⁶ m³. There are about 70% open systems, mainly in the north and east of the country and more closed pipe systems in the drier southern part of the country. Most of the systems were built between 1950 and 1980 and are in need of refurbishment and technical efficient improvements. (Ministry of Environment and Physical Planning, 2011).

B4.3.6. Institutional set-up of the water sector, legal and policy governance

Organization of the water sector

Responsibilities and obligations in water management are shared between several ministries:

- MOEPP - the Ministry of Environment and Physical Planning (MOEPP) – the main governmental body responsible for water issues;
- The Ministry of Agriculture, Forestry and Water Economy (MAFWE) – responsible for irrigation and hydro ameliorative systems);
- The Ministry of Transport and Communication (MTC) – responsible for communal water supply;
- The Ministry of Health (MH) - responsible for the quality of the drinking water;
- The Ministry of Economy (ME) – responsible for issuing concession permits for bottling water and excavation of sand form river beds
The Administration for Environment (AE) is a constituent body of MOEPP. The Department of Water with its 6 units (Water management planning and development, Water rights, Concession and Inter-sectoral cooperation, Vardar river basin management, Strumica river basin management, and Crn Drim river basin management units) is part of the AE. Administration for water economy is part of the MAFWE.

The newly established JSC Water Economy of Macedonia (WEM) is competent for the management of water and hydro ameliorative systems. This company has unified former regional water economies. There are 16 water management divisions in the country. Besides WEM, JSC Macedonian Power Plants manage several reservoirs aimed at energy production.

While collecting water is under the obligation of the WEM, distribution of water in the settlements is under the obligation of local administrations. Besides communal enterprises obliged for water supply in the municipalities, there are 3 regional water supply systems that provide water for more municipalities.

In case of a crisis situation other Governmental bodies and the President are involved. The Crisis Management Center (CMC) is the policy maker, while the Protection and Rescue Directorate (PRD) is the operational body. Both institutions are governmental agencies responsible for activities in emergency situations. For protection against adverse impact of water, the responsible Governmental entity is the MOEPP as well. Flood control, erosion and torrent control in urban areas are responsibility of the Local Self Government Units (LSGUs), while out of the urban areas where the water systems are existing the responsibility is on the Stock Sharing Company Water Economy (AD Vodosponastvo). Places which are out of urban areas, and where no water systems exist, the competence for flood control are not clearly defined.

The administrative capacity in the water sector is weak at both national and local levels especially in relation to protection from the adverse impact of water. The main water management objective is achieving an integrated and coordinated water regime on the territory of the Republic of Macedonia. This includes not only the location and construction of water systems but also the provision of enough quantity and quality of the state of water in a manner that best suits a particular location in a certain period of time. Full integration of environmental considerations into governmental decision-making requires public authorities to have accurate, comprehensive and up to date information.

**Legal framework**

The 2008 Law on Waters provides the framework for the protection and sustainable management of water resources. It regulates issues concerning surface water courses, lakes, accumulations and springs, and ground water within an integrated policy and represents the legislative framework for the future management of water resources. According to the Law on Waters, the Ministry of Environment and Physical Planning has a leading role in the water policy-making. In addition, water issues are regulated by the Law on Environment, the Law on Waters Supply, Collection and Treatment of Waste Water. The main documents for water management are as follow: National Strategy for Waters (adopted in 2012), Water Master Plan (not finished) and River Basin Management Plans (only part of these plans have been prepared).

Based on the Law on Waters, the following have been established: the National Council for Waters (established in 2009), and the National Commission for Dams (established in 2012). Legislation and practice in forest management only declaratively recognizes the role of forests for water related issues as preserving water quality and protection from the adverse impact of water. Although there is legislation, the biggest problem is its implementation. There is no sufficient cross-sectorial cooperation between these 2 sectors.

The Water Strategy of the Republic of Macedonia (2011) sets out how the water sector should look like by 2040, and some of the steps it will need to take to get there. It is a vision where rivers, canals and lakes have improved for people and ecosystems, and where it continues to provide excellent quality of drinking water. It is a vision of a sector that values and protects its water resources and where flood risk is addressed with markedly greater understanding and use of good surface water. The main water management objective foreseen is that of achieving an integrated and coordinated water regime on the territory of the Republic.
of Macedonia. This includes not only the location and construction of water systems but also the control of the quantity and quality state of the water in a manner that best suits a particular location and certain period of time. In the Strategy, actions and measures are given separately for protection against floods and other harmful effects of water, water use, water protection, protected and other areas of importance related to water, professional and operational framework of water management, international cooperation and EU accession process, framework and instruments and economic instruments. The actions and measures include administrative instruments, structural measures, measures for improvement of different types of water use, legal instruments and standards, control and monitoring instruments, data collection and management, economic instruments, etc. In the future, the Republic of Macedonia should put special effort into the training of people dealing with water management. The preparation of investment projects is a demanding and costly process that can only start if financial resources are provided (Ministry of Environment and Physical Planning, 2011).

**Implementation & approximation of EU law**

Several EU Directives (EU-Water Framework Directive (WFD) 2000/60/EC, Directive 1976/160/EC, Directive 91/676/EC, Directive 98/83/EC, Directive 91/271/EC, Directive 1976/ 464/EC and Directive 75/440/EC) have been transposed in the Law on Waters. Furthermore, through by-laws the transposition of the requirements of WFD2000/60/EC concerning river basin plan preparation has been fully achieved. According to the ECRAN report, the WFD is 70% transposed within national legislation; on the other hand, the Flood Directive is only 14% transposed within national legislation. The only issue that is transposed within the law and implemented is setting up a competent authority. The most of the needed issues are transposed within the law but not implemented as follow: Assessment of potential adverse consequences of future floods for human health, the environment, cultural heritage and economic activity; Preparation of flood hazard maps and flood risk maps; Establishing appropriate objectives for the management of flood risks; Establishing measures for achieving appropriate objectives for the management of flood risks; Establishing appropriate steps for coordinating application of Directive 2007/60/EC and Directive 2000/60/EG; Publishing preliminary risk assessment, flood hazard maps and flood risk maps, flood risk management plans, making them available to the public. Description of floods, which have occurred in the past and which had significant adverse impacts on human health, the environment, cultural heritage and economic activity has not been recognized within the legislation.

**B4.4 Assessment of the soil management**

**B4.4.1 Status of the soil data**

A soil information system was established in 2015. This system collects data for the following aspects: soil types, administrative divisions, pH values, organic matter map, CaCO3, clay, silt and sand content, land capability. The most dominant soil types are as follow: Forest cambisols (15.87%), Proluvium (7.25%), Calcolamniosols (5.93%), Ranker (5.68%), and Fluviatile soil (5.45%). On the part of the territory dominant are soil complexes, forest cambisols and rankers, leptosols, regosols (15.07%) and complex of vertisol + redniza leptosols (5.33%). In the mountainous regions, Forest cambisols dominate. On the lake terraces and hilly relief Proluvium soils dominate, while in the plains, fluviatile soils are the dominant soil type (annex - figure 4.14).

**B4.4.2 Monitoring of soil**

**Status of soil**

Soil monitoring systems do not exist in the country. Characteristics of soil profiles analysed in the past are presented in the soil information system. For the purpose of the cadastre, categorization in regard to land capability classes of agricultural land and dominate soils in IV, V and VI quality class has been done (Table 4.8).
Table 4.8 Land capability class of the agricultural zone (Source: Filipovski Gj.2003)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Cadastral classes in ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
</tr>
<tr>
<td>Total area/cad. class</td>
<td>15,340</td>
</tr>
<tr>
<td>*% from total area</td>
<td>2.23</td>
</tr>
</tbody>
</table>

Only 8% of the land is without limitation. About 32.6% of the land has severe limitations that restrict choice of plant or require special conservation practices. Land on V classes could be used for agriculture production but with the need for significant conservation practices. Other land is not suitable for crop production but is suitable for pasture, rangeland, forestland, or wildlife habitat.

**Indicators for assessing the risk of land degradation**

During the preparation of the National Action Plan to Combat Desertification (Blinkov et al 2014), a wide list of indicators for assessing risk of desertification, grouped into four categories was used: physical and ecological (including climate, water, soil, vegetation, water runoff, fire); economic (including agriculture, cultivation, husbandry, land management, land use, water use, tourism); social, and institutional.

Based on these analyses, and taking into consideration the natural conditions and the semiarid climate that affects the central parts of the country, R. Macedonia is highly vulnerable to desertification processes.

**B4.4.3 Soil degradation**

**Erosion**

Water erosion is the dominant type of erosion in the country. According to the erosion map of Macedonia (annex - figure 4.5), an area of 9,423 km² or 36.65% of the total area of the state is in the highest categories (I – III). The total annual erosion for Macedonia is about 17 million m³ or 685 m³/km² per year, with about 7.5 million m³ or 303 m³/km² annually, of sediment moved away from the site where it was eroded (Gjorgevic et al. 1993). A significant part of these deposits within Macedonia, about 3 million m³ annually, is not carried through the downstream sections of the rivers to the exit of the state territory, but are deposited in natural lakes and reservoirs. Irrigation erosion is a problem, too. Erosion due to inadequate irrigation practices, such as furrow irrigation on sloping land, is less serious than other erosion factors. About 40,000 ha of irrigated land is subject to erosion, with an annual average soil loss of about 300,000 m³. (Blinkov and Trendafilov, 2005).

**Land cover and changes in land use**

Agricultural land represents 51% of the total area of the country. Half of the agricultural land is covered with pastures and only 25.86% of the total area is cultivated land. Forest and forest land cover 40% (annex - figure 4.17). Land cover changes in the periods 2000 – 2006 - 2012 are presented in Figure 4.18 in the Annex. The areas under agricultural land and forest and semi-natural areas are decreasing from 37.8% to 36.5% (a -1.3% decrease), and from 61.7% to 60.2% (a -2.5% decrease), respectively. At the same time areas under artificial land are increasing by 0.1%. This change is due to the change of agricultural land and semi-natural areas into artificial areas and water bodies (reservoirs). Conversion of forest into unproductive land is forbidden except in cases of state interest.

Soil sealing is significant type of land degradation. Urbanization was one of the dominant processes of the social and economic development of the country. In the last decade migration has been slowed down and the daily migration movements are expanding especially in the areas of around the economic centres and bigger cities such as Skopje, Kumanovo, Tetovo, Gostivar and Veles. The cities are uniformly distributed, but the population density is not uniform. An obvious expansion of concentration of population and settlements is noticeable in the valleys, creating strong conflict among the statement (recommendations) for protection of the high quality arable land and agricultural development and the necessity of urban development. The mean annual rate of soil sealing for the whole Skopje region is 0.14%. The mean annual decrease
of agricultural land is 0.57%, out of them 0.24% in arable land. Pasture land is also decreasing. On the other hand 11,920 ha has become unproductive as a result of urbanization and industry development. Soil sealing affects fertile agricultural land, puts biodiversity at risk, increases water scarcity and contributes to global warming but together with inappropriate and ‘wild’ urbanization, it significantly contributes to the risk of flooding and damage from flooding. This was one of the reasons for the latest flood, and the damage it subsequently caused, in the vicinity of Skopje in August 2016.

**Decline of organic matter and biodiversity**

Organic matter (OM) is also an important ‘building block’ for soil structure and for the formation of stable aggregates. In essentially warm and dry areas, like Macedonia, depletion of OM can be rapid, because the processes of decomposition are accelerated at high temperatures. The soils under intensive agriculture production on sloping terrain with heavy texture and shallow soil profile are the most vulnerable soils particularly the soils on hilly relief (lithosol, rendzinas, chromic cambisols, vertisols and the soils on colluvial forms). Any decreasing of Soil Organic Matter in these soils especially in lithosol (shallow soil profile) and vertisols (heavy textured soils) can cause serious and swift damage to their production capability (Ministry of Environment and Physical Planning, 2017). Vulnerability of Soil Organic Matter decline is presented in Figure 4.16 in the Annex.

**Organic carbon content in the soil**

There is no soil monitoring in the Republic of Macedonia. Data about organic carbon is not available except for some areas where monitoring was undertaken as part of scientific research/projects.

**Management of contaminated sites**

The total amount of generated waste, including waste from mining is estimated to be approximately 26 million tons /year. Waste arising from mining, physical and chemical treatment of minerals, from agriculture and food processing and municipal waste, yields 90.5% of the total solid waste production. Waste from mineral extraction and processing contains a significant amount of hazardous constituents. Agricultural waste represents the second biggest waste fraction, mainly addressed as by-products, i.e. these types of waste shall represent ‘recyclable’ fractions in agricultural activities. Approximately 3.6 million tons of animal manure per year is applied in agricultural production. Manure management is generally very questionable with respect to the pollution of soil and groundwater. There are no available disposal facilities in Macedonia for agrochemical wastes containing hazardous substances. Municipal solid waste is one of the main fractions of totally generated solid waste. There are approximately 54 active municipal dumps used by communal enterprises and a huge number of non-legal dumpsites created by a population that does not have a waste collection service. According to their environmental risk, active municipal waste landfills are categorized as follows: 16 landfills are with high risk, 16 are medium risk, and 19 are classed as being of low environmental risk. The last four are classified as special cases and need to be closed and/or remediated immediately.

51 big industrial dumpsites cover 259 ha and there are 268*10^6 m³ stored material. 16 out of 51 hotspots are prioritised taking in consideration their hazardous potential. According to the environmental legislation those soils have to be remedied.

Some of existing hotspots are in fact abandoned dumpsites after the closing of old installations. A project for remediation of the very dangerous HCH dumps (waste from a former Lindan production) at the industrial facility OHIS Skopje has just started.

**B4.4.4 Institutional set-up concerning soil management, legal and policy governance**

**Organization of soil management**

The main Governmental institutions responsible for various issues related to soil are the Ministry of Environment and Physical Planning (MOEPP) and the Ministry of Agriculture, Forestry and Water
Management (MAFWE). The following governmental agencies are involved in soil and land related issues: the National Extension Agency (NEA), Agency for Financial Support of Agriculture and Rural Development (AFSARD), Agency for Real Estate cadastre (AREC), and Spatial Planning Agency (SPA).

Soil, as environmental medium, is treated within the Ministry of Environment and Physical Planning (MOEPP). Within the Environmental Administration of the Ministry a unit for Soil exists, but it has insufficient capacity.

Within the Ministry of Agriculture, Forestry and Water Economy (MAFWE) there is no any organizational unit that is dealing only with soil related issues, although soil is covered in various sectors, such as land policy, general agriculture etc. The soil information system is developed through a project coordinated by this ministry. On the other hand, the land management is well institutionalised and organized. Land related issues are predominantly dealt by the MAFWE and its cadastre of agricultural land.

The Ministry of Environment and Physical Planning, through its Department of Spatial Planning, is mandated to manage and implement the policies and monitor the processes of physical planning in the Republic of Macedonia. Spatial Plans are developed by the Space Planning Agency established by the Government of the Republic of Macedonia, upon order by the Ministry of Environment and Physical Planning.

The National Extension Agency (NEA) is responsible for providing high quality consulting services for individual farms in order to improve the quality and quantity of agricultural production in the rural areas, as well as to assist in improving other agricultural practices for soil protection.

Operative protection from soil erosion is the responsibility of the local municipality’s administration and the Joint Venture Water Economy (AD Vodostopanstvo).

**Legal framework**

No specific legislation for soil exists to date in Macedonia. However the Law on Waters contains some articles that refer to erosion (here also soil erosion). Within the Law on agricultural land forbidden activities that address soils indirectly are described the following: e.g. the prohibition of ploughing land with a steepness gradient over 15%, etc. Within the forestry law sustainable forest management is addressed as a main principle. This can also be interpreted as indirectly referring to soil protection. The Law on environment protection also contains articles that address the protection of all mediums including soils. A few years ago (2013) an initiative for the preparation of a separate ‘Law on soil protection’ with a focus on soil pollution was initiated. Several versions have been circulated so far, but preparation of this law has not been finished yet and the process was stopped.

The most relevant document for soil protection is currently the National Action Plan to Combat Land Degradation and Desertification (in a phase of approval). The focal Ministry for the United Nations Convention to Combat Desertification is the MOEPP.

- The National strategy for Sustainable Development of the Republic of Macedonia 2009 - 2030;
- The National Water Strategy, 2011 - 2041;
- The National Rural Programme, 2014 - 2020;
- The National Strategy for Land Consolidation of Agricultural land;
- The Third national communication on climate change – 2014;
- Spatial Plan of the Republic of Macedonia, 2002 - 2020;
- The National Strategy for Sustainable Forestry Development (NSSFD), 2006 - 2026;
- The National Strategy for Biodiversity Protection and Action Plan (new and under preparation);

The national rural programme is focused on investments in physical assets of agricultural holdings and is based on Article 2(1) of the Regulation (EU) No 236/2014 of the European Parliament and of the Council of 11 March 2014, laying down common rules and procedures for the implementation of the Union’s instruments for financing external action; Article 27(1) of the IPARD Sectoral Agreement; Annex 4 the IPARD Sectoral Agreement.
The Waste Management Strategy reflects the national policy in waste management and represents the basis for preparation and implementation of an integrated and cost-effective waste management system. From this short explanation it can be concluded that soil protection is a classical inter-sectorial issue not addressed by one specific legislation, but by several ones as well as by several strategies and action plans.

**Implementation & approximation of EU legislation**

Up to now there are various ‘related to’ but the most relevant national document is the National Action Plan to Combat Land Degradation and Desertification, which is in its final phase.

### B4.5 Overview of the Forestry/Water/Soil/Natural Resource Management projects in the country

There are various projects in place directly for water, soil, forest and biodiversity or indirectly within other projects for risk/disaster management (fire, floods) or projects for rural development.

The total cost of the water infrastructure project - construction of waste water treatment plants in Gevgelija and Kocani and the improvement of Gostivar’s water supply system is 29.1 million euros. For preparation of the Bregalnica River Basin Management plan and implementation for parts of the Strumica river basin plan (Restoration of the Strumica River basin) and the Lake Prespa watershed management plan (Restoration of Lake Prespa Ecosystem), 14 million euros has been committed. The aims of these projects are the implementation of selected restoration measures which in the end will lead to protection of water, improve the living conditions of the population and will support the capacity building over the long-term, and will see integrated management in the basins. All of the above projects are financed by the Swiss Government.

Beside this, the Swiss Government has committed 4 million euros for the project ‘Nature Conservation Programme in Macedonia’ (support the main stakeholders effectively conserve the natural resources of the Bregalnica Region, integrating up to date conservation approaches with the principles of sustainable natural resources management and local economic development agenda) and the project “Integration of Environmental Education in Macedonian Education System, Nature Conservation in Bregalnica Region”.

3 projects related to the water sector have been implemented through the EU-IPA programme:

- “Development of National Water Tariff Study”
- “Development of National Water Study”
- “Reform in the System for Water Supply, Collection and Treatment at Local level”

The projects aim to support the establishment of instruments for sustainable development and sustainable investments in the water sector, as well as support the implementation of the requirements of the Urban Waste Water Treatment Directive and Drinking Water Directive.

The GEF supported (25.3 million euros) project ‘Enabling Trans-boundary Cooperation and Integrated Water Resources Management in the Extended Drin River Basin’ is expected to promote joint management of the extended trans-boundary Drin River Basin on the basis of the Drin MoU (Memorandum of Understanding). Through this project are planned a significant number of sub-projects.

The GEF supported (3.1 million euros) project ‘Achieving Biodiversity Conservation through Creation and Effective Management of Protected Areas and Mainstreaming Biodiversity and Land Use Planning’ is aimed at improving biodiversity conservation and increasing protected areas.

Related to land, there are 2 on-going projects: ‘Support for the Development of National Action Program Aligned to the UNCCD 10 Year Strategy and Reporting Process under UNCCD’ and ‘Land Degradation Neutrality Target Setting Programme’ which aims to define status and trends of LDN indicators (land cover changes, land productivity and organic carbon), drivers of LD and to define targets.
B4.6 Evaluation of the main trends and gaps for natural resource management

Summarizing the previous, the following main trends can be drawn:

**Forest**
- The total forest land in the Republic of Macedonia is 10,918 km² (1,091,857 ha) out of which forests are 835,055 (76.5%) ha or 42.5%.
- The most of the forests (63.4%) are coppice forests and about 30.4% are high forests.
- The total growing stock is 75,939,571 m³ or 82.1 m³/ha and total annual increment is 1,616,782 m³ or 2.02 m³/ha., and is the lowest in Europe.
- Within the forest products gained, the firewood participates with an 80 - 85% share.
- State owned forests are 89.1%, while their part of the total wood mass is 92.2%. Private owned forests are 10.9%.
- The last forest inventory in the country was done in 1979 and that is a huge problem in getting relevant data.
- Huge potential for sustainable use of NWFPs and services which are not yet utilized.
- The management of the forest is under the Public Enterprise Macedonian forests under the Ministry of Agriculture, Forestry and Water Economy.
- The management of forest within protected areas is under the public institutions under the Ministry of Environmental and Physical Planning. These forests are mainly managed for their environmental function and biodiversity protection.
- The legal framework on forestry is harmonized to EU, but the main problem is the implementation phase.
- The Faculty of Forestry sees a relatively high number of students graduate each year. The curriculum is in the phase of improving related to global trends.

**Water**
- The total water resources of the Republic of Macedonia are estimated to be 6.37 billion m³ in a normal year and 4.80 billion m³ in a dry year or 2,300 – 3,000 m³/capita.
- The hydrographic territory of the Republic of Macedonia is divided into four river basins: Vardar (79.9%), Strumica (5.9%), Crn Drim (13%) and Juzna Morava (0.2%).
- Up to now only one river basin management plan for the Prespa Lake watershed that is a sub-basin of Black Drim river is being implemented: 2 are prepared and in procedure for approval and 1 (River Vardar) is in preparation.
- There is no current operational monitoring according to the WFD and the ecological status of surface bodies on a national level has not yet been defined.
- There is no exact data about annual water demand.
- Agriculture with 62.6% has the biggest portion of the water demand. Water scarcity is a problem and because of that a significant number of reservoirs have been constructed.
- So far, 106 smaller and larger irrigation schemes have been built covering an area of 163,693 ha of fertile arable land, i.e. 49.9% of the area that could be irrigated but due to an amortized system this value is lower. Most of them were built between 1950 and 1980 and would need reconstruction and technical efficiency improvements.
- Water losses within the water supply systems are high, too, because of various reasons.
- In the last few years catastrophic floods by rivers and torrents, causing high losses and damages have been the most dangerous natural hazard in the region.
- Exactly 1,539 torrents have been registered in Macedonia. These torrents have caused enormous damage to the Macedonian economy. 32 people died during the torrential floods.
- Most of the existing flood control structures were constructed before the 1980’s. The old technical documents are no longer appropriate and new technical documents are still not developed.
- Up to now, there is no prepared preliminary flood risk assessment, or flood hazard and flood risk maps as well as flood management plan according to the flood directive (FD). The first flood management plan, according to the FD, is for the Strumica river basin, and is still in preparation.
Responsibilities and obligations in water management are shared between several ministries but the main governmental institution is the Ministry of Environment and Physical Planning (MOEPP). Within MOEPP there is a water sector with insufficient capacities. Protection from the adverse impact of water capacities are minimal, both on national and local level. The 2008 Law on Waters provides the framework for the protection and sustainable management of water resources. The Water Strategy of the Republic of Macedonia sets out how the water sector should look like by 2040, and some of the steps it will need to take to get there. It is a vision where rivers, canals and lakes have been improved for people and ecosystems, and where it continues to provide excellent quality of drinking water. The Water Master Plan was begun 15 years ago and is still in action. According to the report of the Environment and Climate Regional Accession Network (ECRAN), the WFD is 70% transposed within national legislation. On the other hand Flood Directive is only 14% transposed within national legislation.

Soil

A soil information system was established in 2015. This system collects data for the following aspects: soil types, administrative divisions, pH values, organic matter map, CaCO₃, clay, silt and sand content, land capability. A soil monitoring system doesn’t exist. Taking into consideration the natural and socioeconomic conditions in the country, Macedonia is highly vulnerable to land degradation and desertification processes. Water erosion is the dominant type of erosion in the country and intolerable erosion categories (I-III) cover 36.65% of the total state area. This matter is treated within the Law on Waters. Due to different human activities 9.08% of the total land becomes unproductive for agriculture, forest, and nature purposes. Soil sealing affects fertile agricultural land, puts biodiversity at risk, increases water scarcity and contributes to global warming but together with inappropriate and ‘wild’ urbanization significantly contribute to the risk of flooding and damage from flooding. According to the legislation, reclamation of landfills tailings and quarries is obligatory but only parts of them are reclaimed. Abandoned landfill tailings (the rest of them being closed installations) are still hot-spots. Soil as environmental medium is treated within the Ministry of Environment and physical Planning (MOEPP) where within the Administration of Environment exists a unit for soil with low capacities. Land related issues are dealt with predominantly within the MAFWE, while spatial planning is under the MOEPP. There is no special law on soil and parts of this mater are treated in various laws. Up to now there are various related national document, but the most relevant is the National Action Plan to Combat Land degradation and desertification, which is still under preparation (in final phase). Soil is a classical inter-sectorial issue not addressed by one specific legislation but by several, as well as by several strategies and actions plans. For this purpose cross-sectorial cooperation should be improved.

B4.7 Conclusions (status quo, trends and gaps regarding all three natural resources)

Although nature management policies are vast in Macedonia, various problems arise and there are some gaps which needs to be filled in order to improve the situation related to nature resource management.

Forest

The last forest inventory, as previously mentioned, was prepared in 1979. That disables effective and efficient planning, as well as research activities. Lacking relevant data may lead one in the wrong direction and causes difficulties during one’s work. This is a major issue at the moment. The Forest Law predicts...
that every 7 years an inventory should be done and the same is also planned in the Strategy for Sustainable Forest Development, but that has not been implemented.

Also there is a lack of cadastral data. Some of the private forest owners still have their very old documents for the ownership, but these documents do not have coordinates of the forests, but the border is described in words. That is the problem in the field because the landscape is totally different after many years, and finding the borders as described in the document is not an easy thing to do. Thus, it can happen that forest engineers from the PE who are responsible for marking trees in the private forests inadvertently make a mistake and mark trees in the state forest and write it down as if it is in the private parcel, or vice versa.

The rural population has started to collect NWFPs and they have become very popular. More and more collectors go to the forest to collect products, but not all of them are educated or trained for collection. Bigger enterprises (processors and traders) have already established their network of collectors and they train them, but that is not the case with the smaller ones. Added value chain is practice in a few small and medium sized companies. The most common practice is selling the product as a raw material.

Also, rural tourism is already promoted but only in the protected areas. The problem is that the forest sector does not even try to start such an activity, although there were opportunities for that from the IPARD funds.

Public enterprise Macedonian forest should not have preferential treatment from the Government in competition and trade.

The barriers, which are mentioned above, cannot secure sustainable nature management. They lead to unsustainable practices, because each sector follows its policy and manages the ecosystems according to their competences while disregarding others.

There are quite a few examples of unsustainable management as regards forests, soil and water. Forest conservation is of decisive importance for the global environment. The Republic of Macedonia has already formulated national policy, but the implementation phase is inappropriate. Forestry should aim at conservation and sustainable utilization of forests with consideration for economic and social development.

**Water**

Water is a limited resource that is under rising pressure from population growth and non-sustainable exploitation.

Hydro ameliorative systems as well as flood control structures have existed for years, and there is damage to these existing systems which should be reconstructed.

Based on the findings from up to now, prepared river basin management plans, should pay significant attention to improving the ecological status of the surface water bodies.

The Water Strategy is well formulated, but also as in the forestry, it fails in the implementation phase.

The transposition of most of the EU directives from the water sector has progressed with the adoption of the Law on Waters. The only part that failure is adverse impacts of water because as regards the EU flood directive only about 14% has been transposed into national legislation.

Institutional capacities are low and should be improved especially in the part of adverse impact of water.

There is no appropriate data for more water issues, although the water information system has been established.

There are a significant number of unsustainable water management practices and the main ones are as follows: a lack of an integrated approach to water resources management in the national regulatory system; overlapping - responsibility of several ministries (MAFWE, MOEPP, ME); High water losses (10 - 60%) in
the pre-existing structures and networks; poor technical conditions and a lack of efficient operational water management practices of existing irrigation schemes; insufficient numbers of sewage systems in urban and rural areas and wastewater treatment plans; insufficient flood control policy; drainage systems as well as systems for protection against floods and erosion are in a poor condition; and finally, insufficient erosion and torrent control measures etc.

**Soil**

Soil erosion is the dominant type of land degradation. According to the Law on Waters, each municipality and water company is obliged to delineate actual and potential erosion risk areas, but until now no activity of this type was implemented in the country. Unsustainable agricultural practices that impact soils are: artificial fires – burning, crop rotation, fertilization practices, crop protection practice, use of uncertified seed and planting material, losses in agricultural biodiversity; construction and management of land reclamation systems, over irrigation that decreases the size of the farm holdings, etc. A soil information system was established but new information are missing because of an absence of a soil monitoring system. The soil related legal and institutional setup are complex and the capacities should be enhanced.

**Land Management**

Regulations related to land management in Macedonia as a former socialist country are very different from EU countries.

Most of the agricultural land is under private ownership (70%). Only 11% of the forests are private property. All private forest parcels are enclaves within the state forests so sustainable management of private forests is almost impossible. There are a lots of forest owners, but the mean value of the private forest parcel is 0.6 ha.

Land fragmentation in Macedonia is one of the problems facing sustainable land management.

Farmers are willing to have their parcels dispersed, because by doing so it avoids some of the risks of the production that can appear on a certain site. There are 4.5 million cadastral parcels with the average size of a parcel of arable land being 0.26 ha (0.2 ha with private parcels; 0.53 ha for state land). There are 80,000 farms with an average 3.5 parcels per family farms and 5 for legal entities with an average parcel size of 0.6 ha/parcels. The average farm size is 2.27ha (crops) and 1.05 ha (vineyard). Also, the traditional inheritance is that each parcel should be divided among all inheritors.

One of the characteristics of Macedonia is abandoned land. After World War II, and especially after the 1963 earthquake in Skopje, when Skopje was announced as an ‘Open City’ a lot of people migrated from villages to the Skopje. In response, many former farmers abandoned their land, and many rural people abandoned their homes and villages to live in urban Skopje.

At the moment, few companies are jointly managing the same area. Actually, spatial management as a concept does not exist in Macedonia, probably because of the different ideas of that term ‘land management’ from EU countries. The Macedonian managing system is in fact resource management. Each of the natural resources is managed by different enterprises:

- Forests – PE Macedonian forests, PI national Parks, local municipality institutions, and private forest owners;
- Pastures – PE Macedonian pastures;
- Water - new established JSC Water economy of Macedonia on a level of hydro-ameliorative system; JSC Macedonian Power plants.
- Water for energy, EVN – one dam and reservoir, several small concessions – energy.
- Fishing – concessions; Hunting - PE Macedonian forests and concessions;
- Protected Areas Management – for National Parks – separate Public institution for each NP and for MPA. For other protected areas (other IUCN category), the Government assigns a competent institution (Blinkov and Stojanovska, 2003).
Although according to the Law on Nature Protection, a management body is responsible for an integrated management of the whole protected area, in reality it is not implemented and the Mavrovo NP is a typical example. The spatial planning agency is responsible for preparation all spatial plans in the country and the Parliament is responsible for adopting those spatial plans in the country. It means that all other plans should be in accordance with the spatial plan. In reality, there are a significant number of cases where sectorial plans for any area are not in accordance with the spatial plan. The Spatial Plan of the Country (39/04) gives clear directions as regards the process of urbanization and development of the settlements.

The barriers, which are mentioned above, cannot secure sustainable nature management. They lead to unsustainable practices, because each sector follows its logics and manages that ecosystem on their own and according to their competences while disregarding others.

There are quite a few examples of unsustainable management as regards forests, soil and water.

B4.8 Recommendations for integrated management/inter-sectoral cooperation of the forest, water and soil resources in the country

*Forest*

The first and most important activity which is recommended should be the forest inventory. That will tell the forest sector at which stage it is at the moment and which steps are need to be taken to improve the situation in the future.

The problem of marking borders between state and private owned forest should be done and introducing GIS for forestry should also be a priority in the country. Introducing modern information system can help, not only to the private forest owners, but also to the employees of the PE. NWFPs started to be an activity that is mentioned between the rural populations, but if it is better organized and planned, it can be significant for the national economy as well. Rural tourism is most widely promoted in the protected areas. Taking into account that there are potentials for this kind of activity, the forest sector needs to follow global trends for sustainable forestry and includes this into their plans. At the moment the forestry sector is still traditional and only wood focused. The monopoly of the PE’s should be turned on to the market economy. Every branch of the PE should establish their price for the products at the market. Private forest owners should be also a factor in influencing the market. At the same time, it must be remembered that they serve the public interest. State measures taken in this area should be adequate to achieve the objectives.

*Water*

The most important thing is capacity building of the water sector within the MOEPP. Flood management should be improved on all scales: from individual up to institutional. There should be established a whole and appropriate water quality monitoring system, according to the WFD. River basin management plans and flood management plans should also be prepared, according to the WFD needs. Multi-hazard and multi-risk maps should be prepared in the event of mountain torrents, taking into consideration the high erosion processes, landslides and landfalls.

*Soil*

Taking into consideration the inter-sectorial issue, the most important thing is capacity building of the soil related sectors within various ministries.

Soil erosion is the one of the major degradation process mentioned in a lot of national documents and erosion control programmes should be prepared and established with a unit within MOEPP that will be responsible for this matter.
A more effective legal framework with regards to the management of natural resources and furthermore the adoption of the needed regulations that will make the framework laws applicable is needed. Ultimately, in order to advance the Macedonian economy and make further steps towards EU accession, the related legal frameworks should be harmonized with the EU standards. Furthermore appropriately scaled management institutions with clear and not overlapping competences over natural resources management shall be established; a continuous improvement of their capacities and coordination is also needed. In addition, mechanisms that will facilitate the sustainable financing of natural resources management in accordance with the user and polluter pays principles, payment for ecosystem services principle in consistency with the socio-economic realities also at local levels shall be developed. The harmonization of the material law related to water, agriculture, forest and nature with the criminal code would further be important to reach, and inter-sectorial cooperation among all. Furthermore there is a need for integrating nature conservation laws into national developmental and economic policies and linking them with efficient monitoring and enforcement mechanisms that would ensure that access to the natural resources is allocated fairly and efficiently to end users. Finally there is a need for effective procedures that will ensure public awareness and balanced participation in the decision-making, following national legal requirements and international instruments.

B4.9 Recommendations concerning follow-up activities for improved national resource management in the country

General recommendations based on the current situation in the country are:
- to practice sustainable forestry activities as provided within the strategy for sustainable forestry.
- to implement obligation from the Law on Waters and measure and activities provided within the water strategy.
- to improve trans-boundary cooperation.
- to adopt secondary legislation related to the Law on Waters.
- to adopt legislation for soil.
- to implement measures and activities provided within the National Action Plan to combat desertification.
- to implement measures and activities related to forest, water and soil within other national documents.
- to continue harmonizing the legislation framework.
- to build administrative capacities for all 3 sectors, and;
- to improve inter-sectorial cooperation.

Recommendation for the near future:
Shift to Ecosystem oriented management should be the future approach in natural resources management. Ecosystem management is managing areas at various scales in such a way that ecological services and biological resources are conserved while appropriate human uses are sustained. Major ecological services include allocation of productivity (energy flow), maintenance of soil fertility (nutrient cycling), and operation of the hydrologic cycle. Biological resources encompass all natural variations found in genes, species, and communities along with the processes that maintain this variation. The appropriateness and sustainability of human uses are dictated by the constraints imposed by the biological and physical environment and by legal mandates for land use (Brussard, 1998).
Reference list of the data used for the assessment

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ANNEX B4.1

Supporting datasets

Figure 4.1 Forest distribution

Figure 4.2 Wood mass per ha

Figure 4.3 Basins and sub-basins
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Figure 4.4 Water management divisions

Figure 4.5 Delineation of river segments

Figure 4.6 Erosion Map

Figure 4.7 Landslides and rock falls

Figure 4.8 Flood events (a) and flooded areas (b)
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Figure 4.9 RYMSIS monitoring network
Figure 4.10 Vulnerability of groundwater

Classification of ecological status of surface water bodies

Prespa Lake  Bregalnica River  Strumica River

Figure 4.11 Classification of ecological status of SWB in few sub basins

Figure 4.12 Water supply systems  Figure 4.13 Irrigation areas
CHAPTER B5
Overview of the Natural Resource Management in Montenegro

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B5.1 Introduction: General Information about Montenegro

Montenegro is located in south eastern Europe (41°52’ and 43°32’ latitude North, and 18°26’ and 19°22’ longitude East) and is a part of the Balkan Peninsula, covering an area of 13,812 km², with a territorial sea surface area of about 2,540 km², and a population of 620,000 (Montenegro Statistical Office - MONSTAT, 2011 census), and with a density of 44.9 inhabitants per km².

Montenegro is classified by the World Bank as an upper middle-income country, and it is also a candidate country negotiating to join the European Union. The GDP (nominal) estimated in 2016 is $4.250 billion or $6,783 per capita. The economy of Montenegro is mostly service-based and is in late transition to a market economy. The most important influence on the GDP formation comes from the following sectors: Tourism (20% of GDP together with related sectors in 2014); Industrial production (9.8% of GDP in 2014); Retail sales (trade accounted for 12.9% of GDP in 2014); Transport (4.2% of GDP for 2014) and Construction (4.6% of GDP for 2014).

Administratively, the state’s territory is divided into 23 municipalities/local government units. Of the total population, 63.23% live in urban zones and 36.77% in rural areas.

The diversity of the geological base, landscape, climate and soil, and geographical position of Montenegro on the Balkan Peninsula has created conditions conducive for high biological diversity. The number of species per area unit index in Montenegro is 0.837. This is the highest index recorded in any European country.

More than 90% of Montenegro’s surface area is more than 200 meters above sea level (m a.s.l.), 45% of its area is lower than 1,000 m altitude, and mountainous areas above 1,500 m altitude cover about 15% of the
state’s territory. Rivers drain into two basins: the Black Sea, which has a total area of 7,250 km² (or 52.5% of the territory), and the Adriatic Sea, which has a total area of about 6,562 km² (or 47.5%).

Three homogeneous geographic regions (see Figure 5.1) are generally distinguished with common geological, climate and vegetation features.

Montenegro lies within the Dinaric Alps, a range dominated by carbonate rocks, with some other sedimentary and volcanic strata, particularly in the north. Montenegro’s climate is strongly determined by its mountains. Besides the occurrence of important vertical temperature and rainfall gradients, local orographic rain may be important. The Dinaric Alps act as a barrier between Mediterranean and continental air masses, and this results in two major climatic zones in Montenegro. In the southern part, the Mediterranean climate prevails, whereas inland, the climate is more continental. The climate profile of Montenegro is characterized by the following data: Mean annual temperature: 11.2°C; Mean annual precipitation: 1,500.5 mm; Mean intensity of heavy rain on days with rainfall in excess of 20 mm: 38.2 mm a day; Mean duration of dry periods: 28.7 days per year; Mean duration of frosty periods: 71.5 days per year; Mean duration of heat waves: 7.5 days per year.

**B5.2. Assessment of the Forest sector**

**B5.2.1. Forest resources and management**

Within the agricultural sector of Montenegro, forests are an important resource for rural areas in terms of their environmental, economic and social value. Forest and forest land management forms an integral part of the objectives and priorities of rural development. At the same time, a large part of forests are habitats and homes to animal and plant species of European importance under the Habitats and Birds Directives and will be designated as Natura 2000 habitats. Forests can potentially generate added value in the wood processing area, renewable energy sources, production of food and tourism. According to a rough estimate, the share of forestry and wood industry in GDP is somewhat less than 2%, which is similar to Slovenia, but is small compared to around 3% in the entire EU, or to almost 6% in Finland. This means that the sectors grounded on forest resources have large growth potential. The National Forest Policy sets out five general objectives:

1. Ensure and improve long-term resistance and productivity of forests and other ecosystems, and maintenance of plant and animal species;
2. Administration of forests and forest resources ensures sustainable implementation of social economic and environmental forest functions;
3. Forests contribute to sustainable social and economic development of rural areas;
4. The Strategy for Wood Industry Development ensures long-term development and competitiveness of the wood industry;
5. Long-term development of forestry as a profession and forestry-related operations.

The National Forest Inventory (NFI) of Montenegro was conducted in the period from 2009 - 2012 for the first time on a scientifically grounded basis. Inventory data clearly show that Montenegro has great forest potential.

**Forest area by management and protection regime**

The NFI results are as follows: Montenegro’s land area is characterised by a high coverage with forest of 59.5% (826,782 ha, relative standard error 0.5 %) and forestland of 9.9 % (137,480 ha); together forest and forestland cover 69.4% (964,262 ha) of the land area. Montenegro's forests are located partly on very steep and rocky slopes; in total, 11.9% of the forest area and 8.4% of the forestland area have not been accessible for tree measurement.

In Table 5.1 the size of forest and forestland are shown, and in the table 5.2 the forest categories (in the format developed in line with the NFI methodology) are outlined. Forest area is considerably higher than...
the best existing best estimates (now at 59.5%, so far estimated at 45%). High forest covers slightly more area than coppice forests while almost 100,000 ha cover forests, where taxation data due to inaccessibility to reach sample plots are not available or forests, which are not measured due to the fact that theirs diameters are under taxation threshold (category: Other in Table 5.2).

Table 5.1 Size of forest, forest land and not forest and not forest land (Source: National Forest Inventory 2010)

<table>
<thead>
<tr>
<th>Area</th>
<th>Area (ha)</th>
<th>Forest (ha)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, Forest</td>
<td>826,781.64</td>
<td>826,781.64</td>
<td>59.5</td>
</tr>
<tr>
<td>2, Forest land</td>
<td>137,480.23</td>
<td>0</td>
<td>9.9</td>
</tr>
<tr>
<td>3, Not forest and not Forest land</td>
<td>424,319.03</td>
<td>0</td>
<td>30.6</td>
</tr>
<tr>
<td>Total</td>
<td>1,388,580.90</td>
<td>826,781.64</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5.2 Forest category (Source: National Forest Inventory 2010)

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Area (ha)</th>
<th>Forest (ha)</th>
<th>%</th>
<th>Forest %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0, Other</td>
<td>535,457.56</td>
<td>99,656.61</td>
<td>38.6</td>
<td>12.05</td>
</tr>
<tr>
<td>111, High forest</td>
<td>376,527.80</td>
<td>371,285.46</td>
<td>27.1</td>
<td>44.91</td>
</tr>
<tr>
<td>113, Coppice forest</td>
<td>356,341.01</td>
<td>355,839.58</td>
<td>25.7</td>
<td>43.04</td>
</tr>
<tr>
<td>114, Brush wood</td>
<td>23,973.51</td>
<td>0</td>
<td>1.7</td>
<td>0</td>
</tr>
<tr>
<td>115, Bushland</td>
<td>80,967.97</td>
<td>0</td>
<td>5.8</td>
<td>0</td>
</tr>
<tr>
<td>116, Maquis</td>
<td>10,417.00</td>
<td>0</td>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>117, Stonesteppe</td>
<td>4,896.03</td>
<td>0</td>
<td>0.4</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1,388,580.90</td>
<td>826,781.64</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Growing stock, increment and felling and (if possible) carbon stock

According to the NFI, the estimate for the wood volume in the total forest of Montenegro is 122 million m³ with an increment of 2.9 million m³, based on the assumption that the inaccessible forests show relative volumes per ha that are one-third below the level of accessible forests (much higher then so far existing estimates which was 72 million m³). The wood volume in accessible forests (728,133 ha), amounts to 116 million m³ with an increment of 2.8 Mio m³ (assessed with a relative standard error of 1.5 %). The average volume per ha forest area is estimated at 159.6 m³/ha (accessible forests, relative standard error of 2.3 %). The broadleaved trees show a volume per ha of only 136.3 m³/ha, in contrast to conifers (293.5 ha). The share of conifers of the volume is 40.2%. The increment of conifers is with 8.1 m³ per ha on average higher as well compared to 2.9 m³/ha of broadleaved trees and conifers contribute with 46.6% to the entire increment.

Table 5.3 Growing stock, increment and felling (Source: National Forest Inventory 2010)

<table>
<thead>
<tr>
<th>Stand origin</th>
<th>Publicly Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m³</td>
<td>m³/ha</td>
<td>m³</td>
</tr>
<tr>
<td>Growing Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>63,502.1</td>
<td>1.0</td>
<td>340,132.5</td>
</tr>
<tr>
<td>High forests</td>
<td>69,371,459.5</td>
<td>284.9</td>
<td>18,448,957.4</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>10,210,663.9</td>
<td>93.8</td>
<td>11,380,842.7</td>
</tr>
</tbody>
</table>
In total, 35 different forest types are found in Montenegro. Forest type group by area (%) shows the dominance of forests of other broadleaves (25.6%), Beech forests (24.3%), Abies Alba Forests (14.4%), Sessile flowered oak and Bitter oak forests (11.4%), forests of other oaks (10.4%) and Picea Abies Forests (7.4%). Having in mind that forest type groups by volume (%) the situation is as follows: Beech forests (34%), Abies Alba Forests (32%), Picea Abies Forests (11.1%) and forests of other broadleaves (6.7%).

Forests in Montenegro (see Table 5.5) are characterised by a dominance of broadleaved trees that cover 76.2% of the forest area. Dominating species are beech, oak species, spruce, fir, and pine specie. In total, 12 conifer species and 59 broadleaf species have been assessed in the National Forest Inventory.
Broadleaf forests dominate both private and public forests, and quality coniferous forests are mostly found in state property.

Table 5.6 Ownership types by forest categories (Source: National Forest Inventory)

<table>
<thead>
<tr>
<th>Forest category</th>
<th>Public forests</th>
<th>Private forests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ha</td>
<td>%</td>
</tr>
<tr>
<td>High forests</td>
<td>243,525.2</td>
<td>29.5</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>108,805.9</td>
<td>13.2</td>
</tr>
<tr>
<td>Mixed</td>
<td>14,083.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Coniferous</td>
<td>127,135.90</td>
<td>26.2</td>
</tr>
<tr>
<td>Broadleaf</td>
<td>223,667.84</td>
<td>46.3</td>
</tr>
</tbody>
</table>

B5.2.2 Forests in support of rural communities

Forests are of vital economic significance to the population of rural areas where forests are one of the main sources of income and of heating energy.

Forestry, wood and non-wood products are an integral part of the rural economy and rural development. In addition to agriculture and rural tourism, they will constitute one of the main options for socio-economic advancement of rural areas. For this purpose, in the period from 2014 – 2020, a part of the EU – IPA funds for rural development and other purposes shall be directed to the development of the forestry sector.

Forest land ownership structure

The share of state-owned forests, according to the NFI, is 52.3%, and private 47.7% (see Table 5.7). As for forestland, private ownership dominates with 58.0%. The public forests show a higher average of wood volumes per hectare - 227.9 m³/ha as compared to 88.7 m³/ha in private forests, and comprise 72.7% the majority of the volume of the forests. It should be noted that the restitution process has not been completed yet, nor the rearrangement of cadastral data for Montenegro. The structure of state-owned forests is much better when compared to private forests, which is best reflected by the quantity of standing volume per spatial unit, being much lower in privately owned forests. Privately owned forests are also characterised by fragmentation.

Table 5.7 Forestland ownership structure (Source: National Forest Inventory)

<table>
<thead>
<tr>
<th>Publicly owned forests %</th>
<th>Privately owned forests %</th>
<th>Forests owned by church %</th>
<th>Communal forests %</th>
<th>Total forest area</th>
</tr>
</thead>
<tbody>
<tr>
<td>52.3</td>
<td>47.7</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
</tbody>
</table>

Public forests and public forest companies

An authorized Forest Administration (FA) administers and manages the forests, forest land, trees outside forests and barren land in state ownership (more than 90%) in Montenegro (see Table 5.8). The administration includes drafting and decision-making in relation to management of forests and forestland in state ownership, as well as the monitoring and control of forest management.
Employment in the forest sector

Currently, 395 people are employed in the forestry sector in Montenegro (not included are those working within concessions and the wood industry): 377 in the FA; 7 in the Ministry of Agriculture and Rural Development (MARD); 11 in Forest Inspection in the Inspection Directorate. Regarding their educational background, the qualified and highly qualified workers dominates (163) while the number of forestry engineers is 94. It has to be noted in this regard that the age structure in the FA is such that the average age of a worker within the FA is 55.

<table>
<thead>
<tr>
<th>Qualified and highly qualified workers</th>
<th>Forestry engineers</th>
<th>Forestry technicians and people with secondary diploma</th>
<th>Administrative and other workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>163</td>
<td>94</td>
<td>69</td>
<td>69</td>
<td>395</td>
</tr>
</tbody>
</table>

Table 5.10 Number of employees in forest-based industries (Source: MONSTAT (Yearbook of Montenegro 2015))

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Processing of wood and production of wood, cork, straw</td>
<td>1239</td>
<td>1344</td>
<td>1335</td>
</tr>
<tr>
<td>Manufacture of paper and paper products</td>
<td>204</td>
<td>171</td>
<td>178</td>
</tr>
<tr>
<td>Manufacture of furniture</td>
<td>540</td>
<td>486</td>
<td>459</td>
</tr>
<tr>
<td>Total</td>
<td>1,983</td>
<td>2,001</td>
<td>1,972</td>
</tr>
</tbody>
</table>

The total number of employees (see Table 5.10) in wood processing and production of wood, cork, and straw was 1,344 for 2014, which is slightly higher than in the year 2013 (1,239 employees). Fewer employees work in the manufacturing of paper and paper products and furniture in 2014 than in the year 2013. Data for 2015 show similar figures. In total, the number of employees in forest-based industries for the year 2014 amounted to 2,001, which is slightly more than in 2015 (1,972).

B5.2.3 Fostering competitiveness of the forest sector and added-value chains

The increase of economic contribution is possible through the inclusion of all of the wood volume flows into the formal economy and an increase in harvesting (with necessary investments in infrastructure and drafting of a new generation of plans) but mostly through the increase of added value in the wood industry chain. Together with mountains and water, forests form a substantial part of the brand of Montenegro in the area of sustainable and green tourism.

Income structure and revenues of state forest company/ies

So far, forests under state ownership were granted for utilization through concession to legal entities. Currently, there are 18 contracts active in 2016 (concession contracts for 7, 15 and 30 years) for a total
gross wood volume of 247,694 m³. The FA generates income dominantly from the revenues from wood sales while the other revenues – revenues from non-wood forest products (medicinal herbs, fungi collection) and hunting are very modest and should be increased. In the period 2013 - 2015, only 2014 was a positive year in terms of gross profit/loss ratio.

Table 5.11 Income structure and revenues for the Montenegrin Forest Administration (Source: Forest Administration, 2016)

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montenegro</td>
<td>Montenegro</td>
<td>Montenegro</td>
<td>Montenegro</td>
</tr>
<tr>
<td>EUR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td>4,321,879.62</td>
<td>4,858,715.67</td>
<td>4,527,189.61</td>
</tr>
<tr>
<td>Revenues from wood sales</td>
<td>4,293,025.59</td>
<td>4,829,642.26</td>
<td>4,496,356.55</td>
</tr>
<tr>
<td>Other revenues</td>
<td>28,854.03</td>
<td>29,073.41</td>
<td>30,833.06</td>
</tr>
<tr>
<td>Total costs</td>
<td>5,166,223.47</td>
<td>4,788,489.61</td>
<td>5,442,258.04</td>
</tr>
<tr>
<td>Gross profit/loss</td>
<td>-844,343.85</td>
<td>70,226.06</td>
<td>-915,068.43</td>
</tr>
</tbody>
</table>

On the basis of the above data, it can be concluded that the FA does not make the same amount of profit as do state companies in Western forested countries which are normally cash bringers to the state budget. In addition to timber, non-wood forest products are also significant for the rural economy, in particular mushrooms, forest fruits and berries. According to the rough annual income for the rural population, it amounts to 5 million euros from these products and for a significant part of the population (28% of households) they represent a permanent source of income.

Public and international funding and investments

Currently, there is no international funding in forestry in Montenegro. By the Concession Contract signed between those who give the concessions and the Forest Administration, those who give the concessions are obliged to maintain the forest road infrastructure and the up-keep of road maintenance.

Forest products and services

The majority of forest products value generated in 2015 was from selling conifer sawn timber and broadleaves sawn timber. The market value of firewood is unclear as no data are available. In addition, it is estimated that the rough annual income of the rural population from NWFPs is around 5 million euros.

Table 5.12 Quantity and value of marketed goods and services for 2015 (Source: MONSTAT 2016)

<table>
<thead>
<tr>
<th>Quantity and value of main marketed goods (incl. NWFP) (up to 10)</th>
<th>Euros (market value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer sawn timber – 81,853 m³</td>
<td>8,851,000</td>
</tr>
<tr>
<td>Broadleaves sawn timber – 7,792 m²</td>
<td>928,000</td>
</tr>
<tr>
<td>Wood windows – 213 pieces</td>
<td>16,000</td>
</tr>
<tr>
<td>Wood doors – 226 pieces</td>
<td>23,000</td>
</tr>
<tr>
<td>Parquet – 1,010 m²</td>
<td>118,000</td>
</tr>
</tbody>
</table>

Contribution of the forest sector to GDP

The majority of forest products value generated in 2015 was from selling conifer sawn timber and broadleaves sawn timber. The market value of firewood is unclear as no data are available. In addition, it is estimated that the rough annual income of the rural population from NWFPs is around 5 million euros.
Trade balance

Trade balance figures have been received from MONSTAT and are presented in tables 12 and 13 below. Sawmill products, logs, and firewood are dominant in the export of forest products in the period 2010 - 2015. There has been a significant increase in export over the last few years, which was 16.2 million euros in 2012 and 30.03 million euros in 2015.

Table 5.13 Trade balance in forest products – Export

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL EXPORT in euros (million)</td>
<td>16.54</td>
<td>19.05</td>
<td>16.2</td>
<td>18.37</td>
<td>23.85</td>
<td>30.03</td>
</tr>
<tr>
<td>Sawmill products</td>
<td>10.89</td>
<td>13.23</td>
<td>10.96</td>
<td>10.95</td>
<td>14.03</td>
<td>17.46</td>
</tr>
<tr>
<td>Logs (wood in the rough, whether or not stripped of bark or sapwood, or roughly squared)</td>
<td>3.53</td>
<td>3.53</td>
<td>2.88</td>
<td>3.71</td>
<td>4.99</td>
<td>6.12</td>
</tr>
<tr>
<td>Buildings’ joinery and carpentry of wood including cellular wood panels, assembled flooring panels</td>
<td>0.28</td>
<td>0.19</td>
<td>0.35</td>
<td>0.37</td>
<td>0.33</td>
<td>0.11</td>
</tr>
<tr>
<td>Wood (including strips and friezers for parquets flooring, not assembled) continuously shaped</td>
<td>0.61</td>
<td>0.56</td>
<td>0.56</td>
<td>0.79</td>
<td>0.47</td>
<td>0.59</td>
</tr>
<tr>
<td>Particle board, oriented strand board and similar board of wood</td>
<td>0.16</td>
<td>/</td>
<td>0.01</td>
<td>0.01</td>
<td>/</td>
<td>0.01</td>
</tr>
<tr>
<td>Fibreboard of wood or other ligneous materials</td>
<td>/</td>
<td>/</td>
<td>0.01</td>
<td>/</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Firewood</td>
<td>0.5</td>
<td>0.75</td>
<td>0.77</td>
<td>1.9</td>
<td>3.14</td>
<td>4.63</td>
</tr>
</tbody>
</table>

Import of forest products in the period 2010 - 2015 was in a range between 22.61 million euros (2012) and 24.48 million euros (2014). The dominant import forest products are buildings’ joinery and carpentry of wood including cellular wood panels, assembled flooring panels and particle.

Table 5.14 Trade balance in forest products – Import (Source: MONSTAT 2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL IMPORT in euros (million)</td>
<td>23.56</td>
<td>22.95</td>
<td>22.61</td>
<td>22.75</td>
<td>24.48</td>
<td>22.80</td>
</tr>
<tr>
<td>Sawmill products</td>
<td>0.95</td>
<td>1.12</td>
<td>1.03</td>
<td>0.97</td>
<td>1.04</td>
<td>0.74</td>
</tr>
<tr>
<td>Logs (wood in the rough, whether or not stripped of bark or sapwood, or roughly squared)</td>
<td>0.69</td>
<td>0.85</td>
<td>0.66</td>
<td>1.09</td>
<td>0.67</td>
<td>0.89</td>
</tr>
<tr>
<td>Buildings’ joinery and carpentry of wood including cellular wood panels, assembled flooring panels</td>
<td>7.21</td>
<td>6.83</td>
<td>6.79</td>
<td>6.55</td>
<td>8.75</td>
<td>7.27</td>
</tr>
<tr>
<td>Wood (including strips and friezers for parquets flooring, not assembled) continuously shaped</td>
<td>3.63</td>
<td>3.2</td>
<td>2.76</td>
<td>2.73</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Particle board, oriented strand board and similar board of wood</td>
<td>3.37</td>
<td>3.72</td>
<td>4</td>
<td>4.01</td>
<td>4.2</td>
<td>4.33</td>
</tr>
<tr>
<td>Fibreboard of wood or other ligneous materials</td>
<td>2.15</td>
<td>2.16</td>
<td>2.23</td>
<td>2.42</td>
<td>2.3</td>
<td>2.53</td>
</tr>
<tr>
<td>Firewood</td>
<td>0.07</td>
<td>0.19</td>
<td>0.4</td>
<td>0.62</td>
<td>0.66</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Illegal logging

The problem of illegal logging and timber trade is significant in almost all countries of the region and in a wider context so that it is not a phenomenon which is specific for Montenegro. Two types of illegal logging
can be distinguished: poverty driven illegal logging and commercial illegal logging. The FA receives data (see Table 5.15) on illegal logging from regional units from the competent authorities. The highest volume of illegal logging in state forests in the period from 2002 - 2015 was in 2002 (5,623 m³) and the best results in combatting illegal activities was obtained in 2013 (2,154 m³).

Table 5.15 Officially Recorded Illegal Logging in State Forests from 2002 – 2015 (Source: Forest Administration 2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>Volume (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>5,623</td>
</tr>
<tr>
<td>2003</td>
<td>3,863</td>
</tr>
<tr>
<td>2004</td>
<td>2,768</td>
</tr>
<tr>
<td>2005</td>
<td>2,380</td>
</tr>
<tr>
<td>2006</td>
<td>3,735</td>
</tr>
<tr>
<td>2007</td>
<td>5,620</td>
</tr>
<tr>
<td>2008</td>
<td>4,178</td>
</tr>
<tr>
<td>2009</td>
<td>4,858</td>
</tr>
<tr>
<td>2010</td>
<td>5,231</td>
</tr>
<tr>
<td>2011</td>
<td>4,679</td>
</tr>
<tr>
<td>2012</td>
<td>3,673</td>
</tr>
<tr>
<td>2013</td>
<td>2,154</td>
</tr>
<tr>
<td>2014</td>
<td>5,442</td>
</tr>
<tr>
<td>2015</td>
<td>4,510</td>
</tr>
<tr>
<td>Total 2002 -2015</td>
<td>58,714</td>
</tr>
<tr>
<td>Average 2002-2015</td>
<td>4,194</td>
</tr>
</tbody>
</table>

A National Action Plan for Combating Illegal Activities in Montenegro was adopted by the Government in 2009 as an obligation of the St. Petersburg Ministerial Declaration on Implementation of the Law in Forests and Administering Forests in Europe and Central Asia (ENA-FLEG). Visible improvement has been reached, especially regarding cross-border cooperation and cooperation between institutions in Montenegro. However, this document needs to be renewed since it is expired in 2013.

B5.2.4 Protection forests and enhancing ecosystem services

More than 99% of standing forests are of natural origin, which puts Montenegrin forests among some of the most natural in Europe. Forests of Montenegro offer a wide set of ecosystem services at the level of local communities, state, region, Europe and the planet. These are primarily:

- Contribution to combating the negative effects of climate change, their mitigation, and adaptation. Montenegrin forests accumulate around 4.6 million tons of CO₂ from the atmosphere annually, which is close to the entire annual emissions of greenhouse gases of Montenegro in 2003 of 5.3 million tons of CO₂ equivalent.¹⁹
- Maintenance, renewal, and upgrading of biodiversity, including genetic resources. High biodiversity of forests is indicated by a presence of more than 67 autochthonous forest tree species, 9 forest habitats of European significance.
- Maintenance and improvement in the quality and quantity of water in one of the most water-rich countries, and mitigating natural.
- Possibility for numerous commercial and social activities (recreation and tourism).

Creating more favourable micro-climate conditions, especially during the summer heat.

The spiritual connection to nature and related cultural heritage.

**Forest health and damages**

Currently, the most important threat to forests (see Table 5.16) is climate change with an increased risk of drought, fire, and biotic pests, and the threat is expected to increase in future. In the period from 2005 to 2010 forest fires annually covered around 1% of the forest area in the country, and in the record year 2012 they covered 7% of the forest area. In the case of the expected more extreme droughts, fire threats can increase up to a level that can cause serious damage to the population and the entire economy. Forest fires, as well as natural disasters, represent a significant cause of forest damage.

**Table 5.16 Forest damages in your country in the last five years (Source: Forest Administration 2016)**

<table>
<thead>
<tr>
<th>Types of forest damage</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Total for the period 2011-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>m³ or ha</td>
<td>m³ or ha</td>
<td>m³ or ha</td>
<td>m³ or ha</td>
<td>m³ or ha</td>
<td></td>
</tr>
<tr>
<td>Human made/state forests</td>
<td>4,679.14</td>
<td>3,672.96</td>
<td>2,153.63</td>
<td>5,441.50</td>
<td>4,509.78</td>
<td>20,457.01</td>
</tr>
<tr>
<td>Human made/private forests</td>
<td>797.96</td>
<td>908.23</td>
<td>745.43</td>
<td>787.05</td>
<td>740.05</td>
<td>3,978.72</td>
</tr>
<tr>
<td>Damages by insects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural disasters</td>
<td>18,152.97</td>
<td>1,147.41</td>
<td>32,890.48</td>
<td>90,456.65</td>
<td>93,220.35</td>
<td>235,867.86</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damages by forest fires (ha)/state forests</td>
<td>4,062.27</td>
<td>4,578.65</td>
<td>169.28</td>
<td>58.23</td>
<td>2,063.81</td>
<td>10,932.24</td>
</tr>
<tr>
<td>Damages by forest fires (ha)/private forests</td>
<td>44,947.30</td>
<td>960.30</td>
<td>2.00</td>
<td>3.65</td>
<td>1,060.20</td>
<td>46,973.45</td>
</tr>
</tbody>
</table>

**Biodiversity conservation and management**

Around 5.8% of forest area is already included in the National Parks, and the planned regional parks will also include a significant share of forest areas. Overall, around 12% of forests and 8% of forestland is inaccessible due to natural obstacles. These areas cover 110,000 ha, which are ‘de facto’ left to natural processes. In the nature protection area the following objectives are of importance to secure forest habitants: A favourable status of forest habitats and species of European importance or those related to the forest; Resilience of forests to the effects of climate change and other threats; Valuation of eco-system services of forests.

**Forest certification in Montenegro**

Support to the FSC Certification Process was granted within the framework of the FODEMO project in 2012 - 2013. It resulted in a detailed action plan on achieving FSC forest management certification with elaborated procedures and formats. It was noted that some good progress on adopting the proposed procedures has occurred, but that significant progress in becoming ready for certification is still to be achieved. The main conclusion was that the state forestry sector is currently not ready for certification because the elaborated action plan has not been implemented. In addition, initial work for understanding the PEFC certification for private forest owners in the northern part of Montenegro (mostly from the Municipality of Rozaje) started with Italian support, but so far no PEFC certified forests exist in Montenegro.
B5.2.5 Institutional set-up of the forest sector, legal and policy governance

**Organization of the forest sector**

The MARD/Directorate for Forestry, Hunting and Wood Industry is in charge of the overall control of the forest sector and has the leading role in the process of forest resource management, and in the development of economic and other sectorial policies, and in the implementation of these policies. The Directorate is supervised by the Director and has at present four units: the Forestry Unit, the Hunting Unit, the Wood Industry Unit, and the Unit for Forestry and Hunting Monitoring Unit.

The FA headquartered in Pljevlja is the competent administrative authority which carries out administrative and related professional jobs in forestry such as: design and preparation of plans in forestry; implementation of NFI; granting works in state owned forest for execution; collecting data on forest status; preparation of maps of forest habitats and forest types; implementation of monitoring of forest health status, sustainability of forest management and illegal forest activities; growing new forests; setting up, management and maintenance of forest informational systems; maintenance and recovery of forest roads in accordance with the Law; preparation of expert basis for regulations, plans and programs; carrying out measures for conservation of biodiversity and forest natural values; guarding forests and forest land against illegal activities; marking trees for harvesting, stamping of assortments and acceptance of felling sites; providing professional assistance to private forest owners; control of works executed as per the operational project; cooperation with scientific research institutions in forestry and other jobs in accordance with the Law.

The forestry inspectorate is placed within the General Directorate for Inspection Control and they are in charge of numerous activities stipulated by Article 87 of the Forest Law (e.g. inspection of forest management plans, forest infrastructure, forest work, and logging operations).

**Legal framework for forest policy**

The main legislation in the forestry sector in Montenegro consists of:

- **Forest Law** (adopted in 2010 and amended in 2015) – regulates silviculture, protection, conservation and improvement of forests, planning, method and condition of forest utilization, construction and maintenance of forest roads, monitoring of forests, as well as other issues of significance for forests, forest land, and forestry. This law shall also apply to the protection, conservation, and utilization of forest trees located outside forests and forestland.

- **Law on Forest Reproductive Material** (adopted in 2007 and amended in 2015) – regulates the approval of basic material for the production of reproductive material of forest trees, production, production control, processing, selling, utilization and identification of reproductive material.


In addition, environmental legislation tackles forestry as great natural recourses in the country.

**Implementation & approximation of EU law**

In October 2010, the EU adopted the EU Timber Regulation (EUTR, Regulation 995/2010) to prevent sales of illegal timber and timber products on the EU internal market. From 3 March 2013, any operator who places timber or timber products on the EU market for the first time must ensure that they have been legally produced. Currently, Montenegro state authorities take no action for the implementation of the first due diligence system. This would be quite feasible for Montenegro, as soon as the recording of timber volumes begins to improve; the Government will decide who is the Competent Authority(ies)\(^2\); the Competent Authority will conduct a risk assessment procedure, which may be implemented by a consultant firm that has put in a tender for the work. In its approximation to the EU, Montenegro shows some progress related to the Chapter 12: Food safety, veterinary and phytosanitary policy. As regards the phytosanitary policy, amendments to the law on agricultural plant seeds and plant health protection have been adopted, as well as a number of rulebooks on phytosanitary measures were adopted. In accordance to the Law on plant health protection (Article 7) the authorized authority for forestry, and the legal and physical persons who

\(^2\) Competent Authorities: One or more in each Member State, to carry out checks at regular intervals on monitoring organisations and operators.
operate within plant health protection in forestry, is obliged to perform in-line with this Law and forestry legislation.

The Law on forest reproductive material was adopted in 2007. It was based on Council Directive 1999/105/EC of 22 December 1999, on the marketing of forest reproductive material. However, some improvements to this law were recommended, in order to simplify procedures, taking into account standards and procedures laid out by the Directive in 2010. In the period to come, a large amount of work by the state authorities is envisaged regarding the Natura 2000 legislation drafting and implementation.

B5.2.6 Forest knowledge base

The NFI of Montenegro provides for the first time in history accurate information on the forests of Montenegro. After the implementation of the sample based field inventory in 2010, the data processing and analysis was done during 2011 and 2012; the collection and preparation of data, the methods used to analyse the data and the results are presented in the inventory report (2013). The inventory is compliant with the standards used by countries with a long forestry tradition, and it involved the application of a systematic sampling in the form of clusters, distributed in the network of 2×2 km throughout the territory of Montenegro, where qualitative and quantitative data (site description, description of stands, and survey of trees) were collected and subsequently processed and analysed.

Educational system & forests

One of the major institutional gaps in the entire forest sector is the lack of education and research institutions in Montenegro. There is just one secondary school in the country educating forest technicians. In the Biotechnical Faculty there is a Centre for Forestry (3 staff), and in Podgorica there is the Forest Institute. There is a demand for forestry engineers on the labour market (in 2009 there were 28 job announcements, in 2010 there were 17, in 2011 there were 26, and in 2012 there were 15). Due to the unfavourable age structure of workers in the FA (average age structure is 55 years) a logical result is a deficit of experts in the forestry sector. The private sector is in the process of consolidation after the privatisation and bankruptcy of most of the formerly state owned enterprises.

There are a significant number of forest professionals who are currently unemployed but provide a basis for strengthening the private sector. This provides an opportunity for development of a service market ranging from inventory, planning, and marking for cutting to logging operations (recently, few companies appeared on the market). This process should be managed by the state institutions through capacity building, certification and contract out services and concessions.

B5.3 Assessment of the Water sector

B5.3.1 Water resources and policy in the country

With an average runoff of 44 l/sec/km², Montenegro is in the top 4% of the world’s territory with regards to the highest average runoff. By its water balance, Montenegro is among the first in Europe. Taking into consideration the fact that 95.3% of watercourses are formed on the territory of Montenegro, it could be said that the water is the most important natural resource of the whole country.

Specific hydrological conditions are determined by the fact that the majority of surface watercourses in Montenegro are of the torrent type so that generally speaking the flow regime is characterized by noticeable autumn and spring maximums and low-water summer periods. Natural lakes in Montenegro are relatively numerous. The biggest lakes are located in lowland areas in southern parts of the territory. Lake Skadar, formed in a vast depression, is also the biggest lake in the Balkans.

The rainiest area in Europe is located in the mountainous area above Kotor Bay (Krivošije). In that area, the annual precipitation is 4,600 mm. In the steep slopes of the Orjen in the place of Crkvice (940m), the
average annual precipitation is 5,000 mm. This is the European maximum precipitation. In peak years it reaches almost 7,000 l/m², especially with precipitation of the orographic character. During the last century, central and northern parts of Montenegro were hit by extreme floods. That area, where the upper watercourse of the Rivers Tara and the Lim is located, is characterized by an especially big medium annual precipitation of about 1,600 – 2,000 mm per year.

Montenegrin terrain is dominated by slopes above 10° (65%), while the gradient between 5 - 10° is included on 28%. Only 7% of the whole territory has a slope of less than 5° where it is possible to intensively use the land for agricultural purposes without risking significant consequences of erosion processes. Landslides happen frequently in the northern part of the country as well as in the coastal part where degraded flysch rests on compact limestone.

The key legislation is the 2007 Law on Water, amended in 2015 for transposition of Directive 2000/60/EC (WFD) and other water directives.

B5.3.2 River basin management

River basin management in Montenegro is regulated by the Law on Water (Official Gazette of Montenegro, no. 27/07 and 32/11) and the Decree on State Administration Organization and Operations (“OG of MNE”, no. 5/12, 25/12, 20/13 and 17/14). The Law on Water is amended at 2015, in accordance with Water Framework Directive and other related EU water directives.

Main documents for the river basin management in accordance with the EU Water Framework Directive are the River Basin Management Plans. Montenegro still doesn’t have national River Basin Management Plans.

Currently, River Basin Management Plans for the Danube and Adriatic River Basins are in the preparation phase, and are expected to be prepared by 2019.

Water resources

Surface water is mainly used for the industrial needs. Around 92% of the population of Montenegro uses groundwater as water supply. Groundwater is also mainly used for industrial purposes. Abstraction of surface and groundwater is presented in Table 5.17.

Water Management data have been collected through regular annual surveys on enterprises and organizations engaged in industry and mining, agriculture, public utility enterprises and municipal assemblies managing public water supply and sewerage systems, based on available records, documents or expert’s estimates.

Table 5.17 Freshwater abstraction and water use in a mill. m3 (Sources: MONSTAT yearbook)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh surface water abstracted</td>
<td>3,200,000</td>
<td>2,877,000</td>
<td>4,561,000</td>
<td>3,339,000</td>
<td>2,794,000</td>
</tr>
<tr>
<td>Fresh groundwater abstracted</td>
<td>98,000</td>
<td>100,000</td>
<td>104,000</td>
<td>98,000</td>
<td>101,000</td>
</tr>
<tr>
<td>Total freshwater abstraction</td>
<td>3,298,000</td>
<td>2,978,000</td>
<td>4,665,000</td>
<td>3,437,000</td>
<td>2,895,000</td>
</tr>
<tr>
<td>Total water use</td>
<td>3,246,000</td>
<td>2,936,000</td>
<td>4,623,000</td>
<td>3,391,000</td>
<td>2,849,000</td>
</tr>
</tbody>
</table>

River basins and topography

In the territory of Montenegro, several significant watercourses are formed, flowing off into two directions and they form the following:

1. Adriatic Sea Basin
2. Danube River Basin
The total area of the part of the Adriatic river basin in Montenegro is about 6,560 km² or 47.5%. The most important watercourses within the Adriatic catchment area are the following rivers: Morača, Zeta, Rijeka Crnojevića and Cijevna, which all gravitate towards Lake Skadar, drained into the Adriatic Sea by the river Bojana. The River Morača flows towards the Adriatic Sea, with its most important tributary, the River Zeta, then the Sitnica, the Ribnica, the Cijevna, the Orahovštica and the Rijeka Crnojevića. All their waters discharge into the Adriatic Sea along the River Bojana. Beside the River Bojana, there are several other watercourses that flow directly into the sea; they are mainly of torrent character and therefore there are neither observations nor measurements of the hydrologic balance parameters available.

The total area of the Danube river basin is about 7,260 km² or 52.5% of the Montenegrin territory. Important rivers within the Danube catchment area are the Rivers Piva, Tara, Ćehotina, Lim, and Ibar. The River Ibar discharges towards the River Zapadna Morava, while in the direction of Drina the rivers Lim, Ćehotina, Tara, and Piva are discharged.

The water balance of the Adriatic Sea Basin is 670 m³/s.
The water balance of the Danube River Basin is 242 m³/s in total.

**River basin management plan and implementation**

The water sector is governed according to an extensive legal framework. The key legislation is the Law on Water (2007), amended in 2015 that aims also at transposing Directive 2000/60/EC (WFD) and other water directives.

Besides the Law on Water, the most important national policy document is the National Water Management Strategy which is currently being drafted. In addition, the River Basin Management Plans for the Danube and the Adriatic Sea River Basin in accordance with the Law on Water and European Water Framework Directive are being prepared. It is expected to be completed by 2020. Within one year from their adoption, planning, implementation, and evaluation of a Program of Measures for each individual river basin will take place according to the adopted Strategy for Transposition and Implementation acquis with the Action Plan for Chapter 27 for Montenegro.

**B5.3.3 Flood management**

**Mountain hazard related to water (torrent, landslide)**

In Montenegro, different forms of erosion and torrents occur. This happens since all Montenegrin rivers (in the upper course or throughout their length) are of torrential character. The works conducted so far to regulate torrential areas mostly relate to technical measures, while biological measures on erosion protection have been used only rarely.

Excess water of diverse origin puts some 24,500 ha of farming and urbanized land (Cetinje) in danger in the territory of Montenegro. That phenomenon is particularly pronounced in the areas surrounding Lake Skadar and the River Bojana, the Zeta Valley, Bjelopavlići, Plav ravine and areas around the Lim, Tara and Ćehotina river valleys. Most of the existing land-reclamation systems are currently not operational. A specific case for the need of protection against water is Kotor, which at times of heavy rains and southerly winds is partly flooded, because the level of its pavement is only 96 cm above the sea level, and the upper tide point is 130 cm. Flood protection assets are state-owned, and local municipality authorities are responsible for the maintenance of structures in their relevant urban areas. The illegal use of flood areas is a problem throughout the country.

In addition to the flood waves that pass downstream in rivers, other potential flood hazards are:

- Flooding from inner water masses generated inside protected zones; they are caused by an absence of or insufficient capacity of constructed drainage systems;
- Unregulated migration of minor and major river channels;
- Lack of enforcement of regulations regarding river banks, even in settlement zones, which require
‘urban type’ regulation for safety, as well as for urban planning purposes (settlements do not have a harmonious urban access to river frontage by means of quays or jetties);

- Torrential river flow and subsequent erosional processes, with sediment deposited in riverbeds, increased water levels and reduced discharge capacities that increase the probabilities of outflow of larger discharges from the minor tributaries; and,
- Unregulated dredging of sand and gravel that disturbs riverbed morphology and represents a ‘trigger’ for flow destabilization.
- Illegal logging, decreasing forest areas and exacerbating erosion and runoff.

In urban settlements flash floods are an additional concern. Construction should not be allowed in flooding zones.

The need for flood protection is mainly related to areas around larger watercourses (the rivers of Moraca, Lim, Tara, Cehotina, Ibar, and Bojana) and fields (Barsko, Cetinjsko, groves of the Matica valley, etc.)

**History of floods and consequences**

Central and northern parts of the country (specifically the upper Tara and Lim regions) were hit by large floods during the last century (e.g. 1963 and 1979 and again in 1999 and 2000). The need for flood protection measures is particularly apparent in those areas near the larger rivers (the Morača, Lim, Tara, Cehotina, Ibar and Bojana) and the large flat karst plain areas.

The International Disaster Database (www.emdat.be) reports that among four natural disasters within the last 10 years in Montenegro, there were three floods that occurred in 2007, 2009, 2010, and in May 2014. Damage and losses caused by the 2010 flood alone amounted to around 44 million euros (see Table 5.18).

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected areas, municipalities</th>
<th>Extent of damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Upper Tara and Lim region, Nikšić valley, Skadar Lake area, Bojana River area, Zeta valley, Bjelopavlici plain</td>
<td>-</td>
</tr>
<tr>
<td>2007</td>
<td>Skadar Lake area, Bojana River area, Zeta valley, Bjelopavlici plain, Nikšić valley, Plav ravine, Lim, Tara, Ćehotina, Morača and Ibar river valleys</td>
<td>-</td>
</tr>
<tr>
<td>2009</td>
<td>Skadar Lake area, Bojana River area, Zeta valley, Bjelopavlici plain, Nikšić valley, Plav ravine, Lim, Tara, Ćehotina, Morača and Ibar river valleys</td>
<td>-</td>
</tr>
<tr>
<td>2010</td>
<td>Skadar Lake area, Bojana River area, Zeta valley, Bjelopavlici plain, Nikšić valley, Plav ravine, Lim, Tara, Ćehotina, Morača and Ibar river valleys</td>
<td>-</td>
</tr>
<tr>
<td>2014</td>
<td>Skadar Lake area, Bojana River area, Zeta valley, Bjelopavlici plain, Nikšić valley, Plav ravine, Lim, Tara, Ćehotina, Morača and Ibar river valleys</td>
<td>-</td>
</tr>
</tbody>
</table>

In Montenegro, floods occur primarily due to the hydrological regime of torrential type, triggered by the fact that about 94% of the territory has a slope above 5% gradient.

**Flood risk management plan**

The organisational background of flood management in Montenegro is established; the structure reflects the requirements of the WFD and the FD. The functioning of the organisation is, however, problematic due to some overlaps in responsibilities. The monitoring system is managed by the Institute of Hydrometeorology and Seismology placed under the jurisdiction of the Ministry of Sustainable Development and Tourism, whereas water management issues are handled by the Department of Water Management in the Ministry of Agriculture and Rural Development.

The number of measuring stations is low and further assistance is needed to fully develop these systems. Sedimentation issues are no priority and actions are needed for monitoring of this specific phenomenon.
The early warning system in operation is under development. Currently, a project for the development of an early warning system is being implemented under the authority of the Sava River Basin Commission, and in Montenegro, all Sava basin rivers are expected to be covered by this system.

Regarding Water Management Base for Montenegro, there is a database for floods, shown in Table 5.19, but we should take into consideration that this document is out of date (2001) and it requires updating.

| Table 5.19 Area and facilities protected against floods (Source: Water Management Base) |
|------------------|------------------|------------------|------------------|------------------|------------------|
|                   | 2011             | 2012             | 2013             | 2014             | 2015             |
| Total area protected against floods, thousands (Ha) | 5,000            | 5,000            | 5,000            | 5,000            | 5,000            |
| Utilised agricultural land, thousands (Ha)          | 74,090           | 74,090           | 74,090           | 74,090           | 74,090           |
| Settlements, number                                  | 9                | 9                | 9                | 9                | 9                |
| Industrial facilities, number                        | 3                | 3                | 3                | 3                | 3                |
| Railway lines, roads, km                             | n/a              | n/a              | n/a              | n/a              | n/a              |
| Total length of embankments, km                      | 10               | 11               | 11               | 11               | 11               |

B5.3.4 Water quality

**Classification of the ecological state of water bodies**

Currently, monitoring in Montenegro is not in accordance with EU Water Framework Directive. It is expected that the monitoring of water bodies in accordance with EU Water Framework Directive will be established until 2018. Monitoring is performed in accordance with the Programme of systematic examination of water quality and quantity in Montenegro. This programme defines the network station for water quality, as well as scope, kind and frequency of analysis of water quality.

According to the Regulation on classification and categorization of surface and underground waters (Official Gazette Republic of Montenegro 2/07) waters are classified in the following classes:

- Class A – can be used in natural state, with eventual disinfection.
- Class A1 – can be used after simple physical treatment and disinfection.
- Class A2 – can be used after corresponding treatment (coagulation, filtration, disinfection).
- Class A3 – can be used after intensive physical, chemical and biological treatments, with prolonged disinfection and chlorination.

Bathing waters are classified into two classes:

- Class K1 – excellent.
- Class K2 – satisfactory.

**A map of the monitoring network**

Water quality monitoring is performed on surface waters and groundwater. The measuring network includes 36 sampling locations on rivers. Depending on the particular river, there are from one (e.g. Vežišnica) to six (e.g. Morača, Lim) sampling locations. Furthermore, there are 11 sampling locations at the three main lakes: Crno (1), Plavsko (1) and Skadar (9). The sampling frequency for rivers and lakes is from four to eight sampling sessions per year. The quality of groundwater is measured at eight locations with a sampling frequency of four times per year.

Water quantity monitoring is also performed on rivers and lakes. There are 44 monitoring stations at the various rivers and streams which measure the water flow and level and, at some stations, water temperature. The water level is also measured at five lakes: Biogradsko (1), Crno (2), Plavsko (1), Skadar (2) and Sasko (1).
Surface water (ecological and chemical status)

Regarding river basin quality management currently, 40% of the rivers showed very good water quality in 2009, whereas about 45% of the rivers had good water quality. This situation deteriorated has with 30% of those evaluated being very good, and 25% of those evaluated being classed as bad in 2012. Using biological indicators based on the saprobity index, rivers followed the trend of low pollution in their upper course, and in their middle and lower course, and they were moderate, critically or strongly polluted. Results show that the most polluted rivers include the Veţišnica, Ćehotina in Pljevlja, Morača in the area of Podgorica, Ibar near Bač and Lim near Bijelo Polje. In terms of lentic waters, in 2012 and according to a trophic index, mesotrophic-eutrophic conditions were found in lakes Skadar and Plavsko (http://www.meteo.co.me).

The last report (2015) on the surface water quality reported the following information:

In the Adriatic Basin, the water of the River Morača River has a good status; the water in the River Zeta is mainly good, natural quality: the water of the River Cijevna also has a good status quality, and the River Crnojevića is considered to be as good as the River Bojana.

In the Danube River Basin, the River Ćehotina and its tributary the River Vezišnica can be considered as polluted. The main cause is discharge from the thermal power plant, the coalmine and the Supljastijena lead and zinc mines in Pljevlja. Mentioned rivers do not have a good status. The River Lim shows a good water status at its upper and middle courses, while the lower part (downstream from Berane) has not reached a good water status. It contains nitrite, and phosphate in some parts. The water of the River Grnčar is mainly of good natural quality, but it is threatened by the low-water regime during summer. The River Kutska (a tributary of the River Lim) generally proves to be very clean. The water of the River Tara is considered to be good, but it is deteriorated by a communal waste deposit site in the municipality of Kolašin and one site in the Municipality of Mojkovac as well as the wastewater from the Trudbenik Company, which produces wood sawdust (biomass) for Pljevlja TPP. The water of the River Tara has a good status along nearly 65% of its entire watercourse. The water of the River Piva has a good status and was considered to be of the best quality of water in Montenegro in 2013.

Groundwater (chemical and quantitative status)

The quality of groundwater is measured at eight locations with a sampling frequency of four times per year. The measuring network for coastal seawater includes 16 sampling locations with a frequency of eight sampling sessions per year. Quality is measured using 38 parameters, including 31 physicochemical, five microbiological and two saprobiological parameters. Of these, four new physicochemical parameters (total nitrogen, orthophosphorus, total organic carbon, and chlorophyll-A) have been added, with measurement to start from 2014.

All of these sampling locations show moderate to the good status of groundwater, but it is important to mention that this monitoring is still is not in accordance with the EU Water Framework Directive. For the determination of the status in accordance with the Water Framework Directive it is necessary to extend the monitoring programme and the network of stations. A project for the improvement of monitoring is in the implementation phase and it is expected until 2018 to have delineated groundwater bodies with determined chemical and quantitative status.

Waste water treatment and reuse

Currently, around 25% of the population is connected to the sewerage system. Wastewater quantities do not include atmospheric or running waters (used for hydroelectric power stations). The wastewater quantities in industry and mining are measured by water gauges. If an organization has no water gauge, the wastewater quantities are to be estimated according to the defined standards of production.
**Table 5.20 Wastewater treatment and reuse in the 2011-2015 period (Source: MONSTAT yearbook (As of 1990, the data have been collected on a three-year basis))**

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total discharged water, in thousands (m³)</td>
<td>56,269</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>38,783</td>
</tr>
<tr>
<td>- from settlements</td>
<td>41,260</td>
<td>-</td>
<td>-</td>
<td>31,029</td>
<td>n/a</td>
</tr>
<tr>
<td>- from industry**</td>
<td>15,009</td>
<td>-</td>
<td>-</td>
<td>7,754</td>
<td>n/a</td>
</tr>
<tr>
<td>Treated wastewater, in thousands (m³)</td>
<td>27,558</td>
<td>-</td>
<td>-</td>
<td>13,456</td>
<td>n/a</td>
</tr>
<tr>
<td>- in settlements</td>
<td>16,236</td>
<td>-</td>
<td>-</td>
<td>9,482</td>
<td>n/a</td>
</tr>
<tr>
<td>- in industry**</td>
<td>11,322</td>
<td>-</td>
<td>-</td>
<td>3,974</td>
<td>n/a</td>
</tr>
</tbody>
</table>

*Data only from production.*

**B5.3.5 Water demand**

**Water supply**

In the urban areas of Montenegro, more than 97% of the population has access to the public water supply network, which means 60% of the country’s population. Groundwater is the main water source for drinking water. Urban (and industrial) developments represent a threat to the water supply context. Indeed, aquifers are at risk near major settlements, such as Nikšić, Danilovgrad, Podgorica, and Cetinje, as well as in the Zeta plain, revealing pollution impacts in all monitoring locations.

Per capita, water consumption in Montenegro is 229 l/day (Water Directorate), with higher consumption occurring on the coast (about 260 l/day) than in inland municipalities (225 l/day). These average values are exceptionally high when compared with standard values, revealing serious water loss problems. Indeed, average water losses in Montenegro are estimated at 60%, reaching an extreme value considering typical European patterns. This problem could be a consequence of the deterioration of supply networks and illegal connections. On the other hand, the water consumption asymmetry between the coast and inland areas is normal in many countries. In the present case, this is caused by the tourist activity in the Adriatic zone and the high water demands during peak periods.

**Water scarcity and droughts**

There are insufficient data and information on drought and damages caused by drought in previous years. Drought in Montenegro was not permanently monitored in the past. There is no archive on the damages dedicated particularly to drought. Nonetheless, a drought impact archive was created during the project DMCSEE. Collected data on the economic impact of drought on an annual basis shows that during dry years the maximum losses in electricity production range from 3 – 3.5 million euros.

Collected data on water supply show that in Podgorica, the capital of Montenegro, water supply uses about 2,000l/s, with a daily injection into the water supply system of about 130,000m³. The drought in December 2011 reached an unprecedented lowest water level in Montenegro. In the agricultural sector
during crop production suffered the greatest damage (damages are estimated at 30% to 60% of expected yield). Throughout the crop, production livestock was largely impacted.

In 2007, Montenegro ratified the EU Convention to Combat Desertification (UNCCD) (http://www.ncsa-montenegro.com).

Montenegro is expected to develop its own national strategies directly involved in combating droughts. The program is expected to be part of existing and future agro-ecological programmes on local and national levels.

**Irrigations**

In 2012, 1,971 thousand m³ of water was used in the agricultural sector, 97% being abstracted from groundwater sources. The water quality for the agricultural sector presents a major problem in two locations: in the cultivated land at Štoj near Ulcinj, where crops are irrigated using salinized groundwater, and in the Zetska ravnica area (Zeta River Plains) where irrigation water is contaminated by organic pollutants.

The irrigated area represents less than 3% of the total agricultural land and of this, with only about 12% having modern irrigation methods with drip irrigation systems, namely in Ćemovsko. The irrigation systems encompass the areas of Ulcinjsko Polje (100 ha), Mrčev Polje (220 ha), Sutorina (120 ha) and Bjelopavlička ravnica (840 ha); an open channel drainage networks operates in Crmničko Polje, Tivatsko Polje, Lješkopoljski lug and parts of Bjelopavličkaravnica. In 2013, water losses in the irrigation system were 19%, a value that contrasts with those recorded in most agro-systems of European countries (25% – 50 %) (Master Plan for Irrigation).

**B5.3.6 Institutional set-up of the water sector, legal and policy governance**

**Organization of the water sector**

According to the Water Law and the Decree on State Administration Organization and Operations (“OG of MNE”, no. 5/12, 25/12, 20/13 and 17/14), water management is the prime responsibility of the Ministry of Agriculture and Rural Development (MARD). The Directorate for Water Management within MARD is the main government institution responsible for water management in Montenegro. The scope of work and responsibilities of the Ministry encompasses the following duties: development of a water management policy; a systematic solution for the provision and use of water, water land and water sources for water supply, water protection against pollution, water and waterway development and protection against harmful effects of water; monitoring of water quality; systemic and other incentives aimed at improvement in the subject sphere.

The Ministry of Sustainable Development and Tourism (MSDT) is responsible for public utility activities, water supply, collection and treatment of urban waste waters. The Ministry of Health (MH), through the IPH, where physical and chemical water analyses and microbiological testing of drinking water are carried out, is responsible for the control and monitoring of drinking water safety. The Ministry of Interior (MI) is responsible for emergency management. Also, the Ministry of Economy (ME) is responsible for hydro energy, whereas the Ministry of Transport and Maritime Affairs (MTMA), through the Maritime Safety Agency (MSA), is responsible for pollution of the sea by navigable vessels.

Other administration bodies and institutions in charge of particular segments related to water quality are: the Directorate for Water (DW), in charge of issuing water licenses, preparation of plans, programs and balances in the area of water management, preparation of documentation for determination of springs for regional and urban water supply and establishment of sanitary protection zones for such springs. The Institute for Hydrometeorology and Seismology (IHMS) is in charge of the monitoring of quality and quantity of surface and groundwater, flood forecasts and monitoring of the hydrological situation, giving warnings to institutions in charge of flood risk management. The Environmental Protection Agency (EPA) is in charge of the monitoring of environmental status and preservation of nature, collection and update of data on the quality of all environmental segments, water included and reporting to national and European institutions.
Legal framework

An extensive legal framework governs the water sector. The key legislation is the 2007 Law on Water, amended in 2015 for the transposition of Directive 2000/60/EC (WFD) and other water directives.

The Law on Water (OG 27/07, 32/11, 48/15) prescribes the main goals for sustainable water protection and management, as well as the terms and conditions for implementation of water management activities. The Law declares as main principles of water management the following aspects:

- the prevention of deterioration of aquatic ecosystems;
- ensuring the good status of waters; progressive reduction of pollution of groundwater;
- sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use;
- public participation in decision-making related to waters; and
- mitigation of the effects of floods and droughts.

Under the 2008 Law on Environment the Environmental Protection Agency (EPA) organised and implemented the monitoring of all the environmental segments. Based on the new Law on Environment, adopted by the Parliament in July 2016, the EPA is organising and implementing the monitoring of all segments of the environment, except for water quality. Water quality is the responsibility of MARD as defined by the 2015 Law on Water, and previously in the 2007 Law on Water.

The use of natural resources is subject to fees, which, according to the Law on Nature Protection (OG 51/08, 21/09, 40/11, 62/13, 6/14), should be based on the user pays principle. Use of natural resources requires a permit/licence. In the case of legal entities, user rights are in general, awarded within the framework of concession agreements for areas such as water abstraction, mineral resource extraction, and forest exploitation.

Implementation & approximation of EU law

The National Strategy and Action Plan for the transposition, implementation and enforcement of the EU acquis as regards the Environment and Climate Change (the Strategy with AP) 2016-2020 was adopted in order to achieve gradual and complete transposition of the entire EU acquis as regards Chapter 27 - Environment and Climate Change into the legal system of Montenegro. In November 2013 based on the Screening Report presented by the European Commission, the Council decided that Montenegro needs to fulfil the opening benchmark in order to open the negotiations with the EU for Chapter 27 (Environment and Climate Change).

The transposition of the majority of the EU water directives is within the competence of the Ministry of Agriculture and Rural Development (MARD). Responsibilities for transposition of some of the directives (Water Framework Directive, UWWT, and Flood Directive) are partly shared between MARD and other ministries (Ministry of Tourism and Sustainable Development, Ministry of Interior). This sharing “issue” is resolved through the Water Working Group, which works with coordination from the Ministry of Agriculture and Rural Development.

Improvement of the monitoring of surface, underground and coastal seawater on the territory of Montenegro, together with the establishment of a Program of Measures by 2018, is the basis for all further activities in the area of water resources management and preservation of their quality. In parallel with the establishment of a monitoring system, River Basin Management Plans (RBMPs) will be prepared by 2020 based on existing and reliable data. Within six months of their adoption, the drafting of a Program of Measures for each individual river basin will take place. A very important document in the sense of sustainable water management is the Water Management Strategy, which is currently in the adoption phase. This document will establish long-term directions and objectives of water management and quality preservation.
B5.4 Assessment of the soil management

B5.4.1 Status of the soil data

There is no continuous monitoring of the soil in Montenegro. Soil monitoring is partly provided through Biotechnical Institute and Institute for Hydrometeorology and Seismology (only temperature). There is no data on a national level about soil status. The National Environment Protection Agency is conducting some monitoring on soil erosion and soil contamination at specific hot spots.

B5.4.2. Monitoring of soil

Status of soil

Monitoring of soil is a part of the unique Environmental monitoring system. Soil monitoring defines priorities in the management of the environment. The responsible institution for soil monitoring is the Environmental Protection Agency (EPA) within the Ministry of Sustainable Development and Tourism.

There are two types of soil monitoring: the monitoring of soil contamination by hazardous substances, and the monitoring of soil quality.

With regard to soil contamination monitoring, a programme is in place to monitor agricultural land near traffic lines, landfills and industrial facilities. In 2009, it covered 15 of the country’s 22 municipalities with 87 samples being taken at 52 locations. However, due to a reduction in the budget in 2010, monitoring was conducted in only 9 municipalities at 28 locations, and between 2011 and 2013, in 10 municipalities at 36 locations. At the majority of locations, there is one sampling session annually, though in the period 2009 – 2011, at several locations there were two sampling sessions. The municipalities of Nikšić, Pljevlja, and Podgorica have the highest number of sampling locations.

The soil is examined for the following hazardous inorganic substances: cadmium, lead, arsenic, nickel, copper, cobalt, chrome, fluorine, zinc, boron, molybdenum; and for the following organic substances: polycyclic aromatic hydrocarbons, polychlorinated biphenyls, and terphenyls, organotin compounds and pesticides.

To date, soil contamination monitoring covers only local soil contamination. No diffuse soil contamination monitoring is conducted. It is not clear, however, what the country’s approach to local soil contamination is, whether an inventory of contaminated sites has been developed, and what should be the approach to managing such an inventory (i.e. a hazard-based versus a risk-based approach).

Indicators for assessing the risk of land degradation

Montenegro’s relatively small area is characterized by a diversity of geomorphological shapes and forms. Only 10% of the territory is below 200 m above sea level, 35% from 200 to 1,000 m, 40% from 1,000 to 1,500 m, while about 15% is above 1,500 m (Radojicic, 2002).

The coastal (southern) region changes rapidly into hilly mountain terrain which ends in the peaks of the mountain massifs of Rumija, Lovcen, and Orjen (1,600 – 2,000 m altitude). To the north and north-east of those massifs, the terrain changes into the karst region of West Montenegro. The wider area of the Niksicko province, Bjelopavlice and Zeta plain, together with Lake Scadar, makes up the Central region. The northern region includes the Piva river basin, the upper course of the rivers Moraca and Cehotina then Tara, Lim and Ibar, and extends to the north-east end or to the border with neighbouring countries. In this region, the relatively narrow valleys are suitable for agriculture, with deeper and more fertile soils formed on deposits characteristic of karst or glacial and riparian erosion. The hydrographic, hydrological and hydro-geological characteristics of Montenegro have a great influence on land use.
Indicators for assessing the risk of degradation are:

- Geomorphology.
- Geology.
- Hydrogeology.
- Hydrology.
- High amount of precipitation.

Through the change of purpose and permanent loss of land, the damage to agriculture has been done and also other damages and negative consequences are evident: the erosion of land, environmental pollution, destruction of cultural heritage sites and a decrease in the attractiveness of certain areas.

Due to small investments and insufficient care for planning and protection of land, large areas of arable land are exposed to floods, excessive underground waters, ponded irrigation, and salinisation. The situation is similar in protection against erosion, torrents, ensuring irrigation, re-cultivation and creating new surfaces by means of meliorations.

### B5.4.3 Soil degradation

**Erosion**

Important factors of land degradation are erosion (by water, wind) and in-situ (inside the very profile) damage to the land (physical, chemical, biological). Reduction of the land fertility, degradation and inappropriate exploitation of land resources leading to degradation of the ecosystem and endangering the biodiversity, are the categories of unsustainable or unstable development. Therefore, there is a reasonable need for optimal land management for the purpose of adequate protection, rational use and development.

All levels of erosion are evident in Montenegro (map 8). The majority of land is under weak to middle erosion. Intensive erosion takes place in the Pljevlja basin, especially in the watercourse of upper Tara and Lim. Unplanned construction in the Durmitor area, which is threatening the development of tourism and ecological balance, such as soil erosion on Durmitor caused by deterioration of ski slopes. The area of Gornja Morača and along the borders of Bjelopavlička Plain is also under impact of erosion.

**Land cover and changes in land use**

According to the Spatial Plan of Montenegro, the agricultural land covers approximately 5,140 km² or 37% of the territory; the forests covers approximately 6,622 km² or 45% of the territory, and settlements, roads, stony areas and other categories cover approximately 2,442 km² or 18% of the territory. Since a cadastre for agricultural land and land covered with forest has not been established, and since the standards for their recording have not been harmonized, one part of the territory is recorded both as forestland (not overgrown forest) and as agricultural land (meadows).

Montenegro has only 741 km² of the higher quality agricultural land (5.4% of the territory). This indicates that it has special importance for Montenegro. The major part of the higher quality land, (75.6%) is located in the following municipalities: Podgorica 17%, Pljevlja 14.5%, BijeloPolje 14.2%, Berane 9.5%, Bar 7.4%, Nikšić 7.3%, Ulcinj 5.7%; other municipalities 0.8 – 3.9%.

Based on the data from 2003, arable land and gardens cover 448 km², orchards around 95 km², vineyards around 38 km² and meadows around 1,314 km². The total surface of the arable land amounts to 1,897 km² or 0.31 ha per inhabitant. Montenegro is among the countries without sufficient arable land. Considering only fields, orchards and vineyards as cultivable land, as in EU countries, it is considered very poor in arable land (0.09 ha per inhabitant).

If we consider urbanization, the construction of different industrial buildings and other infrastructures in river valleys, karst and coastal areas and especially in the vicinity of settlements, as well as all other land use changes (due to the expansion of forestland on the count of pastures and meadows, and erosion degradation), statistical data on agricultural land become overrated. On the one hand the area of arable land
was reduced by 17% between 2000 and 2012, and the area of permanent crops declined by about 6% in the same time period. On the other hand, the area of meadows has grown (13%). These are unfavourable trends with regards to the low share of fertile land (arable land) in agriculture in Montenegro.

**Decline of organic matter and biodiversity**

In the area of Montenegro, a systematic assessment of organic matter reserves in soils has not yet been done.

**Organic carbon content in the soil**

There is no methodology for analysing organic carbon by DPSIR for Montenegro. The analysis of organic soil carbon is defined as one of indicators for defining land status. This indicator should monitor the content of the organic carbon in the layers of land in order to determine the degree of soil degradation. Determining the content of organic carbon in the soil represents the basis for the calculation of the accumulation of organic matter in the layer up to one metre below the ground. Currently, Montenegro is developing an environmental information system which will obtain all environmental data (soil, water, air etc.). With regard to forest monitoring, a national forest inventory is in the final stage of development.

Biomass and carbon are determined using the single trees wood volume and tree species or tree species group specific conversion and expansion (Source: The First National Forest Inventory of Montenegro).

<table>
<thead>
<tr>
<th>Owner ship</th>
<th>Biomass</th>
<th>Carbon</th>
<th>Carbon increment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>per forest area</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Unit</td>
<td>$1000 t$</td>
<td>$t/ha$</td>
</tr>
<tr>
<td>State owned</td>
<td>137617</td>
<td>369.4</td>
<td>38993</td>
</tr>
<tr>
<td>Private</td>
<td>49921</td>
<td>139.6</td>
<td>15199</td>
</tr>
<tr>
<td>Total</td>
<td>187538</td>
<td>251.0</td>
<td>54192</td>
</tr>
</tbody>
</table>

*Figure 5.2 Organic carbon content in soil (Source: The First National Forest Inventory of Montenegro)*

**Management of contaminated sites**

To date, soil contamination monitoring covers only local soil contamination. No soil national contamination monitoring has been conducted to date.

Four management steps were defined for the management and control of local soil contamination, namely site identification (or preliminary studies), preliminary investigations, main site investigations, and implementation of risk reduction measures. In Montenegro, currently 10 potentially contaminated sites and 5 contaminated sites were identified. On one contaminated site, remediation measures were completed.

**B5.4.4 Institutional set-up concerning soil management, legal and policy governance**

**Organization of soil management**

The Ministry of Agriculture and Rural Development (MARD) is in charge of soil monitoring and for protection of soil from water pollution. In the Ministry, two departments are dealing with this issue, namely the Department for Water Management and the Department for Agriculture. In the Ministry of Tourism and Sustainable Development (MSTD) and the Environmental Protection Agency, which is responsible for environmental monitoring including soils.

**Legal framework**

The monitoring of soil is regulated by the Law on Environment (OG 48/08, 40/10, 40/11, 27/14), Law on Agricultural Land (OG 15/92, 59/92, 27/94). The Law on Water (OG 27/07, 32/11, 48/15) has an important role in the protection of soil.
The Law on Environment (Official Gazette of the Republic of Montenegro 48/08) is the umbrella law for issues of environmental protection. Article 33 defines that the monitoring, inter alia, refers to the observation of emission, i.e. the quality of air, sea, soil, flora and fauna, as well as utilization of mineral raw materials.

Laws:
- Law on Water (OG 27/07, 32/11, 48/15).
- Law on Environment (OG 48/08, 40/10, 40/11, 27/14).
- Law on Plant Protection Products (OG 51/08, 40/11, 18/14).
- Law on Forests (OG 74/10, 40/11).
- Law on Agricultural Land (OG 15/92, 59/92, 27/94).

Regulations and rulebooks:
- Regulation on the national list of environmental indicators (OG 19/13).
- Rulebook on the methods for testing of pesticides (OG 11/99).
- Rulebook on the conditions for production line, marketing, import and sampling of pesticides and fertilizers (OG 12/99).

Implementation & approximation of EU legislation

There are two main documents which define the process of approximation and implementation of the EU acquis in Montenegro:

1. The National Strategy and Action Plan for the transposition, implementation and enforcement of the EU acquis as regards the Environment and Climate Change (the Strategy with AP) 2016-2020; and

The main objectives of these strategies are:
- The long-term management of water and soil.
- Ensuring a sustainable use of resources.
- Improving both the standard of living of the rural population and the standard of rural development in general, whilst preserving traditional values; and
- Strengthening the capacities.

B5.5 Overview of the Forestry/Water/Soil/Natural Resource Management projects in the country

In the period from 2014 – 2020, a part of the EU – IPA funds for rural development and other purposes shall be directed to the development of the forestry sector. According to the National Forest Strategy, IPARD funds will be used for rural development especially in the following areas: Afforestation, additional planting and tending of young and degraded stands; Forest fire protection; Rural infrastructure, including rural and forest roads; Diversification of rural economy related to forests; Investments in small forestry enterprises, wood industry and tourism in rural areas. In 2015, the MARD prepared the Programme of Development of Agriculture and Rural Areas in Montenegro within IPARD II (2014 -2020). Currently, there are no other forestry donors’ projects, but the significant donor funds (10 million euros) have been spent in the period 2003 – 2013 by the Government of Luxembourg (FODEMO project).

In the water sector currently five projects have been implemented in Montenegro:
- GEF - SCCF project of water management on the Drina River Basin.
• The WBIF project Support to Integrated Water Resources Management on the Drina River Basin.
• Nexus “Water-Food-Energy-Environment” – supported by the Italian Ministry for the Environment, Land and Sea and UNECE.

In the soil sector there no international projects are funded so far.

**B5.6 Evaluation of the main trends and gaps for natural resource management**

Since 2003 the reform process in the forest sector has been in process and has been supported by international projects and the following results have been achieved so far:

• The adoption of the National Forest Policy in 2008.
• The adoption of the National Action Plan for Combating Illegal Activities in Forestry in 2009 (visible improvement has been reached, especially regarding cross-border cooperation and cooperation between institutions in Montenegro).
• The legislative framework has been completed - Forest Law, Law on Reproductive Material of Forest Trees and the Law on Hunting and Game.
• Completion of the NFI in 2010, which was the first for Montenegro. Results show that there has been an increase in the area of forest and forestland.
• Wood Fuel Consumption Study (prepared by MONSTAT in 2013) providing the first valid information about total wood consumption in the country.
• Improving forest management practices and methodologies (integration of Natura 2000 requirements in forest management planning is drafted).
• Developing the blueprint for the new institutional framework through Functional Analysis of the Forestry Sector Institutions and Business Processes Review.
• Building human resources in forestry with the assistance of international projects and institutions - training on combating illegal activities in forestry; training on Natura 2000 requirements.
• Preparation for FSC certification. Action plans for FSC Forest Management certification and FSC Chain of Custody certification were developed, including training.
• Improvement of the information base - needs assessment and technical specifications for Forest Information System (FIS) were prepared. The first phase of setting up FIS (procurement of hardware and software including training) was finalized in 2013 in the framework of the IPA project.
• Actions to add value to and facilitate use of the forest resources, such as developing the sustainable woody biomass market in Montenegro;
• Adoption of the National Forest Strategy (2014). It lists priority measures for forest improvement, as well as indicative amounts and financial sources for its implementation.

The FA is one of the few state services that are present in rural areas, in daily contact with the rural population. The FA should recognize its role within the processes of motivating rural development and adequately prepare itself for fulfilling this role. Current and future quantities of harvested timber provide the basis for developing the added value chain of wood industry and other activities. In their present setup, the state forestry institutions (MARD, FA) are still unable to implement all domestic, EU and international legal requirements and standards. This is due to insufficient human resources, decreasing budgetary funding within the forestry sector, and incomplete implementation of the results of the institution building projects. In the coming years, a critical issue will be the ability of the forestry institutions for programming and implementation of EU funded activities under IPARD and other components of IPA. Another weakness is to be found in the capacity of the private sector in the forestry and wood industry. Private owners are poorly organised and the forestry and wood processing companies are seriously undercapitalised in all aspects (human resources, equipment, financing and knowledge). The result is that the economic potential of the forests is underutilised resulting in symptoms such as poor balance in exports of raw material and import of final products from wood, or the ‘grey market’ of fuel wood. As the total harvest is only around half of the increment, this does not seriously threaten the overall sustainability of the forest resource, but threatens the economic sustainability of the sector and has a direct negative impact on fiscal revenues.
Although floods are not a main problem in Montenegro, there is a need for installing a flood protection along a few rivers. Flood management requires water monitoring on the ground, a preparation of projects for river regulation, and educated employees to manage all these activities.

Major investments will be necessary especially for a construction and/or modernization of the urban waste water collection and treatment system, and the introduction of new water treatment and water supply technologies in accordance with the EU Drinking Water Directive. Ensuring financial resources for the implementation of the Directive 91/271/EEC concerning urban waste water treatment is very important in order to prevent further uncontrolled discharge of waste water into natural recipients without treatment.

The following challenges related to the objective of achieving a good water status arise in the Montenegrin context: Upgrade of monitoring of soil, surface and groundwater and coastal sea waters, identification of areas endangered by nitrate pollution and other pollutants, definition of ecological and chemical status and aims for surface and groundwater, establishment of a Water Information System. There are also only a few stations for monitoring groundwater quality and quantity in Montenegro. The monitoring programme is not harmonized with the EU Directives requirements, and as such, a monitoring programme harmonized with parameters and water classification schemes contained in EU Directives would be beneficial.

In the field of drinking water quality, it is necessary to establish a monitoring programme at a national level. The current monitoring programme is based on contracts between water supply companies and laboratories.

**B5.7 Conclusions (status quo, trends and gaps regarding all three natural resources)**

To reach the vision of forestry in Montenegro defined in the National Forest Policy – “Improve the existing condition of all the forests so that the protection, environmental, social and economic forest functions are balanced, and sustainability ensured”, it is important to further strengthen the institutional framework in the MARD and FA. In the context of its aspiration to become an EU Member, effective management of its forests is of strategic importance to Montenegro for the following reasons:

- Fulfilling the political criteria: the reform of state administration and good governance in the forestry sector should establish effective rule of law on more than half of the territory;
- Rural Development perspective: forests and forest products offer one of the strongest potentials for endogenous development of rural areas in the north of Montenegro and represent a significant element of the attractiveness of the country in terms of tourism;
- Application of EU standards: numerous EU regulations and policies (e.g. Natura 2000 and forestry related acquis) are to be transposed and implemented into the forestry sector among other policies before becoming a member state.

An efficient and effective state forest institution reform is needed to manage the forestry sector to help it follow modern and international obligations and requirements. It is important to further strengthen the institutional framework. In addition, it is clear that the state forestry sector in Montenegro needs further awareness raising and skills improvement to respond to international forestry obligations.

The FA is one of the few state services that are present in the rural area, in daily contact with rural population. In the case of taking a management role in areas of future Natura 2000, the need for the cooperation of the FA and the local population will be even higher and more intense. The future forest management plans should include measures of adaptation to climate change in terms of increasing the resilience of forest ecosystems and their protection against forest fires and other threats. The cooperation with the concessions is of the utmost importance and shall result in updating of the concession contracts to be in line with the FSC requirements and in that those who offer the concessions understand and respect the needed changes in the way that forest operations have to be conducted and documented. Only when the aforementioned has been completed would it be advisable to launch the tender of certification and
to select a FSC accredited certification body. Forest sites in accordance with the Natura 2000 legislation will be managed through forest development plans and forest management programmes. Objectives of protection should be incorporated into the plans and programmes and after that the sites will be managed so as to ensure favourable status of species and habitats.

Attention should be paid to the protection of flora and fauna species of European importance. An important priority will be the management of hunting areas of special purpose under the competence of the FA. These hunting areas are to be the population centres of animal species for Montenegro and the wider region and the remaining hunting grounds should also properly meet the requirements laid down by the Law on Game and Hunting. Because of the provisions of the EU Habitat Directive, changes of legislation regarding the individual species would also be required, especially for large carnivores (bears, wolves, lynxes) in terms of their stricter protection. There are a significant number of forest professionals who are currently unemployed, but who could provide a basis for strengthening the private sector. This provides the opportunity for development of a service market ranging from inventory, planning, and marking for cutting to logging operations. This process should be managed by the state institutions through capacity building, certification and contracting out services and concessions.

The following future priorities of the forestry sector in Montenegro in relation to its institutional development and investments are required to obtain sustainable forest management.

**Institutional development:**

- Improving the institutional framework as per findings of the Functional Analysis of Forestry Sector Institutions and Business Process Review;
- Securing an adequate budget for the state forestry institutions and improving the motivation of forestry staff;
- Development of a project preparation and implementation unit within MARD for project preparation in forestry and rural development;
- Training (international reporting; international obligations - timber regulations, FOREST EUROPE, FLEGT; extension service; project preparation; communication/both internal and external);
- Enhancing cooperation with the wood industry;
- Supporting private forest owners associations.

**Investments** (using funds from the budget, IPARD and other IPA components):

- Integrating forestry measures and objectives into the IPA Rural Development Programme 2014 – 2020;
- Development of a new generation of forest management plans (state budget);
- Programming, designing and building of forest/rural Infrastructure (IPARD);
- Completion and implementation of the FIS with a focus on timber regulations and FLEGT requirements (establishing an IT based system of tracking timber);
- Establishment of protected areas and implementation of nature conservation measures in forests.

Identified investment priorities for the development of water and soil sectors are:

- Development of River Basin Management Plans for the Danube River Basin and Adriatic Sea River Basin is key for good water management.
- Establishment of a water information system (for good data management) and environmental information system.
- Development of Flood Risk Management Plans.
- Infrastructural works regarding UWWT and flood protection.
- Implementation of a code of good agricultural practice.

Regarding all three resources, the following main conclusions may be drawn:

- Establishment of a database for all three natural resources is needed, and this database will have many positive implications on the future of the natural resources management (e.g. decision-making, report preparation etc.).
The nexus of all three natural resources sectors is of crucial importance for the future sustainable use of natural resources.

**B5.8 Recommendations for integrated management/inter-sectoral cooperation of the forest, water and soil resources in the Montenegro**

In order to manage vital natural resources for Montenegro (forest, water and soil), it is recommended to enhance internal cooperation and coordination of all sectors and create joint procedures of staff employed. It is important that both the FA and the Water Administration are under the same Ministry (MARD), so it would be easier to set up in-house modus operandi for data collection and develop joint platform for the implementation of main objectives. Special attention should be paid on actions that maintain and improve the quality and quantity of water and mitigates the impact of natural disasters. Another positive step for an integrated approach for forest and water is that the National Forest Policy and National Forestry Strategy recognized the importance of water management and land use. The National Forest Policy Statement 21- Integrated forest administration and planning across the whole country and harmonisation of sectors’ plans stressed the following: “At the level of forest administration plans, there will be harmonisation with other planning documents, such as spatial and urban plans, hunting plans, watersheds administration, regional and rural development plans, protected areas administration plans”.

Although some measures and actions which relate to all three resources are not implemented due to various reasons (e.g., institutional constraints, lack of human resources, finances, etc.) a positive form of procedure could be to create a synchronised approach of the Government of Montenegro in the EU approximation process. With regards to the environmental chapter, which is very complex, a positive force is to act collectively and create a common understanding as well as to join forces of an effective integrated natural resources team in which forestry, water and soil experts need to be involved.

Due attention should be paid to adequate planning of necessary administrative capacities and financial resources. Namely, strengthening of personnel capacities was recognised as a necessity at all levels (local, state, project implementation units, etc.). Cooperation with faculties and other scientific institutions in all areas of natural resources management should be specifically strengthened. Since there are numerous institutions with similar competences in this field, Montenegro will have to ensure clear division of competences and coherence between activities of all involved bodies. Coordination between institutions in charge of different aspects of water management is limited. What is missing is a solid inter-sector approach which would enable correct management of forestry-water-soil resources, and this situation impedes further smooth transposition and implementation of EU directives.

Identification of common challenges is the result of a systematic approach and active participation of all relevant institutions in the water sector, and they may be classified as problems related to:

1. Administrative capacities.
2. Inter-sector approach.
3. Provision of finances for capital investments and implementation of regulations.
5. Information and education of the population.
B5.9 Recommendations concerning follow-up activities for improved national resource management in the Montenegro

On the basis of the aforementioned data and analyses, it is recommended to take immediate action by the state Montenegrin institutions and to establish a task force for coordination and monitoring of natural resources. The possible key objective of the task force would be a synchronisation and integration of activities, responsibilities, and command and control of integrated natural resources management. The main tasks of establishing the task force are to advise and coordinate all technical and financial support to the natural resources and implementation of the sectorial policies (forest, water, soil, environment, rural development), which includes: Implementation of natural resource policies and strategies including the National Forestry Strategy; development of a natural resource legislation; reform of government institutions and nature based services; building of human resources capacities at all levels.

Specifically, the task force will:

- Support the preparation of work plans, budgets and terms of reference for the working groups, commissions, and other bodies defined by policies and strategies;
- Advise and, where appropriate, agree on aspects of cost sharing between various ministries and donors;
- Establish a harmonised monitoring, reporting and accounting process for all technical and financial support of in-line ministries and donors - the purpose being to create a single, harmonised and more efficient system for budgeting, coordination, and reporting for the integrated natural resources management;
- Support promotion of integrated natural resources management through various communication and PR activities.
Reference list of the data used for the assessment


Decree on classification and categorization of surface and ground waters


Gap analysis and needs assessment in the context of implementing EU Flood Directive in the Western Balkans - Country report, Montenegro

Gazette of the Republic of Montenegro 2/07)


Law of Forests (Official Gazette of the Republic of Montenegro 74/10)

Law on Water (Official Gazette of the Republic of Montenegro 48/15)


Montenegro’s agriculture and European Union Agriculture and Rural Development Strategy

National Strategy with action plan for transposition implementation and enforcement of the EU Acquis on environment and climate change 2016-2020


Protection and Sustainable Use of the Dinaric Karst Transboundary Aquifer System – Montenegro country report

Reconciling resource uses in transboundary basins: assessment of the water-food-energy ecosystems nexus in the Sava River Basin

Spatial plan of Montenegro until 2020: Government of Montenegro, 2008

Statistical Yearbook of Montenegro 2016

Strategic Master Plan for waste water management in the central and northern region of Montenegro

Strategy for water management of Montenegro – Draft


The Second National Communication on Climate Change of Montenegro to the United Nations Framework Convention on climate change (UNFCCC)
ANNEX B5.1

Supporting datasets

Figure 5.3 Forest category in Montenegro
Figure 5.4 Forest, forest land and not forest and not forest land in Montenegro
Figure 5.5 Forest ownership in Montenegro
Figure 5.6 Stand origin in Montenegro
Figure 5.7 Wood increment in Montenegro

Figure 5.8 Wood volume in Montenegro
CHAPTER B6
Overview of the Natural Resource Management in the Republic of Serbia

Ratko Ristić, Nada Dragović, Branko Stajić, Boris Radić, Tijana Vulević

B6.1 Introduction: General Information about the country

Serbia is located in the central part of the Balkan Peninsula and covers 88,361 km². The territory consists of two different regions: the large Vojvodina plain to the north and the hilly and mountainous area to the south, with the Danube and Sava rivers marking the border between them.

According to the results of the 2011 Census of population, released by the Republic Statistical Office, 7,186,862 inhabitants, or 92 inhabitants per km² live in Serbia. Serbia is classed as a medium populated European country. During the last decade, Serbia was characterised by a decrease in population rate, a decline in the birth rate and a concentration of population in urban areas. Based on the results of the 2011 Census, the population in Serbia decreased by 4% compared to 2002.

Serbia’s primary industries include processing of base metals, furniture, food, machinery, chemicals, sugar, tires, clothes, and pharmaceuticals. The main export products of Serbia in 2015 were industrial products, clothes, cereals, vegetables, and non-ferrous metals. The main Serbian agricultural products are wheat, maize, sugar beets, sunflower, raspberries, beef, pork, and milk.

In 2009, after higher rates of economic growth in the period 2001 - 2008 an average growth rate of 4.95% was achieved, with the Serbian economy recording a negative growth rate of GDP of 3.5%. In 2012, the annual growth rate of GDP was -1.5% and in 2014 GDP -1.8%. In 2009, GDP per capita lowered from €4,445 to €3,955, while in 2014 the value of GDP reached €4.672 per capita (http://www.stat.gov.rs).

GDP structure by sector is: services 57.9%, industry 25.5%, and agriculture 16.6%. In 2015, the dominant share of the export structure included: road vehicles, electrical machinery and equipment, fruit and vegetables, cereals and cereal products, and non-ferrous metals. The most important export destinations are Italy, Germany, Romania, the Russian Federation and the countries of the region (http://www.pks.rs/PrivredaSrbije.aspx).

B6.2 Assessment of the Forest sector
B6.2.1 Forest resources and management

The National Forest Inventory (NFI) from 2008, indicates different categories of land and their use by types of land, like forests, which comprise 29.3% (2,252,400 ha), other wooded land 4.9% (382,400 ha), unproductive land 1.2% (92,000 ha), agricultural land 46.4% (3,594,800 ha), meadows and pastures 13.3% (1,029,600 ha), urban land 4.0% (312,000 ha) and inland water bodies 1.1% (85,200 ha), a total of
7,748,400 ha. A very unfavourable state of the afforested area (equal to 7%) was found in the Vojvodina region.

Oak and beech forests cover 720,800 ha (32.0%) and 660,400 ha (29.3%) of the total forest area, respectively. Conifer forests are found on 243,200 ha (10.8%), while poplar plantations and other forests cover 48,000 ha (2.1%) and 580,000 ha (25.8%), respectively.

Besides the undesirable national afforestation level (compared to an optimal level of 41.4%, defined in the National Spatial Plan) and extremely high percentage of coppices, present conditions of forests require more attention, to silvicultural and better utilization of stand and sites potentials regarding wood production. Nevertheless, concerning forest resources in general, the following problematic issues can be concluded:

- The insufficient average value of volume and volume increment per ha.
- Unfavourable structure by origin. Nearly two-thirds of forests are coppice, with an average volume of 124.4 m³/ha and a volume increment of 3.1 m³/ha (compared to high nature forests (253.6 m³/ha and 5.5 m³/ha).
- Unfavourable structure by structural form (even-aged forests dominate with 91.6%)
- Preservation status. There are 608,000 ha of insufficiently stocked forests (27% of the total forest area) with the average annual wood production being 3.1 m³/ha.
- Unfavourable assortment structure of growing stock regarding wood volume: round wood (33.5%) and fuelwood (66.5%)
- Unfavourable access of forests by forest roads. At the level of PE „Srbijašume“- 11.86 m²/ha, for PE „Vojvodinašume“- 9.09 m²/ha, for National parks from 14.88 to 18.3 m²/ha. Another issue is the low quality of forest roads, mainly passable in dry (summer) seasons, which complicate transport of timber. In addition, the safety standards and labour law in this part of forestry sector is far below western standards.
- Usage of non-wood forest products and biomass production is under developed.

Forest area by management and protection regime

Data from Table 6.1 are a combination of several sources including the Directorate of Forests data, NFI data, and Statistical Office data. There are no available data regarding the stand origin of felling, and the table shows the data in total. Another issue is the quality of presented felling data, which is taking over from the Statistical Yearbook, but this matter will be emphasized in the report chapter about illegal logging.

Table 6.1 Size of forest area by management (economic, non-economic) and protection regime (Source: NFI 2008; Statistical Yearbook of Serbia, 2015 (Directorate of Forests 2015))

<table>
<thead>
<tr>
<th>Vegetation form</th>
<th>Available surface</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic Forests</td>
<td>Non-Economic Forests</td>
<td>Protected Forests</td>
<td>Special Purpose Forests</td>
<td>Protective forests</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
<td>ha</td>
</tr>
<tr>
<td>1. High forest</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>796,000</td>
</tr>
<tr>
<td>2. Coppice forest</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>1,456,400</td>
</tr>
<tr>
<td>1+2. All forests</td>
<td>1,001,447</td>
<td>149,139</td>
<td>461,784</td>
<td>125,777</td>
<td>514,253</td>
<td>2,252,400</td>
<td></td>
</tr>
<tr>
<td>3. Shrubbery</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>92,000</td>
</tr>
<tr>
<td>4. Barren</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>92,000</td>
</tr>
<tr>
<td>3+4. Shrubbery and barren</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>92,000</td>
</tr>
<tr>
<td>5. Other forest areas</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>382,400</td>
</tr>
<tr>
<td>FAO forest (1+2+3+5)</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>2,634,800</td>
</tr>
<tr>
<td>6. All forest and forest land</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>2,634,800</td>
</tr>
</tbody>
</table>
Growing stock, increment and felling and carbon stock

Total (standing) volume reaches 362,487,418.00 m\(^3\) and the annual volume increment amounts to 9,079,773.00 m\(^3\). The average values of wood volume and volume increment are 160.9 m\(^3\)/ha and 4.0 m\(^3\)/ha respectively. Based on the Statistical Office of the Republic of Serbia, official harvesting volume in 2014 was 2,655 million m\(^3\) (Table 6.2). Additionally, according to the available data on the national level and methodology, carbon stock values are shown by forest land categories: above ground biomass, below ground biomass, carbon in dead wood, carbon in the litter, and soil carbon, as it is in Table 6.2.

Table 6.2 Growing stock, increment and felling, and carbon stock (Source: *NFI 2008; **Statistical Yearbook of Serbia 2014; ***FRA 2015 (data are compiled from the Statistical Yearbook of Serbia 2014, Directorate of Forests Data 2014, NFI 2008))

<table>
<thead>
<tr>
<th>Forest types</th>
<th>State Owned</th>
<th>Privately Owned</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 m(^3)</td>
<td>m(^3)/ha</td>
<td>000 m(^3)</td>
</tr>
<tr>
<td>Growing Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>117,875</td>
<td>266</td>
<td>39,636</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>84,002</td>
<td>136</td>
<td>97,187</td>
</tr>
<tr>
<td>Plantations</td>
<td>19,544</td>
<td>144</td>
<td>4,246</td>
</tr>
<tr>
<td>Total</td>
<td>221,418</td>
<td>185</td>
<td>141,069</td>
</tr>
<tr>
<td>Total annual volume increment*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>2,481</td>
<td>5.6</td>
<td>906,672</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>1,919</td>
<td>3.1</td>
<td>2,539,717</td>
</tr>
<tr>
<td>Plantations</td>
<td>995</td>
<td>7.3</td>
<td>238,291</td>
</tr>
<tr>
<td>Total</td>
<td>5,395</td>
<td>4.5</td>
<td>3,684,680</td>
</tr>
<tr>
<td>Average annual felling**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High forests</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Coppice forests</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Plantations</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Total</td>
<td>2,173</td>
<td>1.8</td>
<td>478</td>
</tr>
<tr>
<td>Carbon stock mill. metric t (2015)***</td>
<td>AGB(^{22})</td>
<td>BGB(^{23})</td>
<td>CDW(^{24})</td>
</tr>
<tr>
<td>Forest</td>
<td>185.3</td>
<td>51.6</td>
<td>33.4</td>
</tr>
<tr>
<td>OWL</td>
<td>9.5</td>
<td>1.2</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>194.8</td>
<td>52.8</td>
<td>34.3</td>
</tr>
</tbody>
</table>

Forest types and ownership by management regime

Broadleaves species are predominant in Serbia, with the exception of the south western part of Serbia where conifers grow in their natural areas. Additionally, at Kopaonik (central-southern Serbia) and Tara (western Serbia) mountain conifers are predominant. The main economic forests are beech, oaks, black locust, and pine cones (Table 6.3).

\(^{22}\) AGB-above ground biomass.  
\(^{23}\) BGB-below ground biomass.  
\(^{24}\) CDW-carbon in dead wood.  
\(^{25}\) CL-carbon in litter.  
\(^{26}\) SC-soil carbon.
From the total forest area, high nature forests occupy the area of 621,200.00 ha or 27.6% (in state forests 37% and in private forests 17%), coppice forests cover 1,456,400.00 ha or 64.7% (52% in state and 79% in private forests), and forest plantations cover 174,800.00 ha or 7.8% (11% in state owned and 4% in private forests). Regarding mixture category, mixed forests are present in 4% of the state and 1% of private forests, coniferous are presented in 13% of state owned, and 5% in private forests, while broadleaves cover 83% in state and 94% in private forests (Table 6.4).

### B6.2.2 Forests in support of rural communities

#### Forest land ownership structure

The two major stakeholders in the forest sector are the state and private forest owners. Based on the National Forest Inventory data from 2008, the ratio between private and state ownership is 47:53 (Table 6.5). Private forests are under direct control of public forest enterprises, which provide expert and technical support to the private forest owners. Such support is directly financed by the state budget, but only towards public enterprises, while they indirectly support forest owners mainly with planting materials. The total number of private forest owners is estimated to be 1 million. The average size of property and plots is around 1 ha and 0.3 ha, respectively.

Although nearly one half of the total forest area is under private ownership, it appears that current forestry practices and development efforts have been significantly neglected towards the state owned forest. Although the present forest law improved some relation to the private forests, it is obvious that majority of activities in forestry sector are still focused on state owned forests.
Natural Resource Management in Southeast Europe: Forest, Soil and Water

### Table 6.5 Forest land ownership structure (Source: NFI 2008)

<table>
<thead>
<tr>
<th>State owned forests</th>
<th>Privately owned forests (included forests owned by church)</th>
<th>Communal forests</th>
<th>Total forest area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>53</td>
<td>47</td>
<td>-</td>
<td>2,252,400</td>
</tr>
</tbody>
</table>

### Public forests and public forest companies

The state owned forest areas in Serbia are organised in eight public enterprises (PE “Srbijasume”, PE “Vojvodinasume”, 5 PE National Parks and PE “Goc-sume”), as well as several waterworks and agricultural organizations, and educational research bases of the Faculty of Forestry in Belgrade. Responsibilities of public enterprises for forest management include: (1) Cultivation, protection, conservation and utilization of forests; (2) Raising and utilization of game; (3) Engineering, construction and maintenance of forest roads; (4) Preparation of management programs and plans; (4) Technical operations in private forests; (5) Advancement and utilization of public-beneficial functions of forests; and (6) Wholesale and retail trade in forest products.

Companies “Srbijasume” and “Vojvodinasume” are organised in three levels:
1. Head office in Belgrade and Novi Sad.
2. Forest Estates.
3. Forest Administration Units (Field Units).

The condition of state-owned forests, in general, can be characterized as satisfactory (Table 6.6). In addition, the average volume in these forests is 184 m³/ha, and volume increment amounts to 4.5 m³/ha. The percentage of increment is 2.4%, which is a positive indicator as regards the potential for improvement of Serbian forests by means of sustainable forest management and good forest practice.

### Table 6.6 State forest company/ies in Serbia (Source: Directorate of Forests 2014)

<table>
<thead>
<tr>
<th>Public enterprise</th>
<th>Forest area (ha)</th>
<th>Volume (000 m³)</th>
<th>Increment (000 m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Srbijasume</td>
<td>899,613</td>
<td>125,000</td>
<td>4.6</td>
</tr>
<tr>
<td>Vojvodinasume</td>
<td>129,922</td>
<td>20,158</td>
<td>6.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,029,535</strong></td>
<td><strong>145,128</strong></td>
<td><strong>5.3</strong></td>
</tr>
</tbody>
</table>

The status of ownership changes can be granted only by legislative amendment. Also, the companies cannot sell forest and forest land, with the exception of small isolated parcels connected to private properties. Such smaller forest lands that can be sold upon obtaining the consent of the Serbian Government.

### Employment in the forest sector

Employment in the forestry sector displays a large variety of education profiles, from forestry technicians, engineers, to lawyers, economists, and ecologists. Additionally, forestry workers are included on the list, but their number can vary which depends on direct engagement from different private companies and entrepreneurship.

### Table 6.7 People employed in the forestry sector by education (Source: Forest data reporting package for FRA 2015-Serbia (Directorate of Forests Data, 2015))

<table>
<thead>
<tr>
<th>Qualified and highly qualified workers</th>
<th>Forestry engineers</th>
<th>Forestry technicians</th>
<th>Administrative and other workers</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,145</td>
<td>1,527</td>
<td>3,054</td>
<td>1,910</td>
<td>7,636</td>
</tr>
</tbody>
</table>
At the end of 2016, the total number of employees in the wood processing and furniture production industry was 30,754 (15,552 in wood processing; 15,222 employees in furniture production), with an increase of 2,262 employees (7.9%), compared to the end of 2015. The wood processing industry is an industrial sector with a number of comparative advantages, because the production is based on a domestic raw material base. At the end of 2016, a total of 4,133 business entities were active in the wood industry of Serbia, of which 2,540 were companies (1,786 in wood processing; 754 in furniture production) and 1,593 were active entrepreneurs.

Table 6.8 Number of employees in forest-based industries (specify sub-sectors if possible: paper, board, etc.) (Source: Draft National Action Plan for Support of Export on Added Value Products from Wood Industry in Serbia, 2016)

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture of wood and products of wood and cork</td>
<td>5,305</td>
<td>5,076</td>
<td>9,234</td>
</tr>
<tr>
<td>Manufacture of paper and paper products</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manufacture of furniture</td>
<td>6,732</td>
<td>6,441</td>
<td>11,717</td>
</tr>
<tr>
<td>Entrepreneurs</td>
<td>1,011</td>
<td>968</td>
<td>1,760</td>
</tr>
<tr>
<td>TOTAL</td>
<td>13,048</td>
<td>12,485</td>
<td>22,711</td>
</tr>
</tbody>
</table>

B6.2.3 Fostering competitiveness of the forestry sector and added-value chains

At present, the Serbian forestry sector appears not to be receiving as much assistance from the government in its development effort as the sector deserves. This can be seen from the lack of implementation of adopted forest policy directives (Forestry Development Strategy of the Republic of Serbia) and from limited budget allocations, both of which may give an indication of government priorities. Allocation of funds from the central budget for silvicultural and forest state improvement activities during the past years have been minimal and are decreasing, but later analyses from the Directorate of Forests has shown the necessity of increasing the budget.

Based on data from forestry public enterprises, it is evident that the majority of revenues they have come from wood sales (from 92% to 98%). Other revenues are mainly related to non-forest products and subsidies (Table 6.9).

Table 6.9 Income structure and revenues of state forest companies (Source: PE Srbijasume and PE Vojvodinasume data, 2015)

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>000 EUR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td>78,255</td>
<td>73,603</td>
<td>79,747</td>
</tr>
<tr>
<td>Revenues from wood sales</td>
<td>72,303</td>
<td>67,869</td>
<td>78,197</td>
</tr>
<tr>
<td>Other revenues27</td>
<td>5,951</td>
<td>5,734</td>
<td>1,550</td>
</tr>
<tr>
<td>Total costs</td>
<td>77,414</td>
<td>75,383</td>
<td>72,521</td>
</tr>
<tr>
<td>Gross profit/loss</td>
<td>840</td>
<td>- 1,780</td>
<td>7,225</td>
</tr>
</tbody>
</table>

Public and international funding and investments

Table 6.10 clearly shows that public funding in the forestry sector is mainly oriented towards road and harvesting (including silviculture) infrastructures, with a strong influence on private forests, and hunting.

27 Other revenues relate to renting of offices, hunting, NWFP, projects and subsidies (partially).
Mentioned funding/subsidy is a part of annual funding process through the so called ‘forest fund’ and through financial sources for protection and improvement of forests.

Table 6.10 Public and international investments/funding (Source: Directorate of Forests data, 2015)

<table>
<thead>
<tr>
<th>Public funding (e.g. subsidies) in 000 $ - 2015.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvesting infrastructure</td>
</tr>
<tr>
<td>Road infrastructure</td>
</tr>
<tr>
<td>Human resources and qualifications</td>
</tr>
<tr>
<td>Private forests subsidy</td>
</tr>
<tr>
<td>Hunting</td>
</tr>
<tr>
<td>Forest monitoring</td>
</tr>
<tr>
<td>Other outsourcing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>International funding (in forestry projects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribution of Sustainable Forest Management to a Low Emission and Resilient Development</td>
</tr>
<tr>
<td>Implementation of Innovative Forest Management Planning Considering Economic, Ecological and Social Aspects in Serbia</td>
</tr>
</tbody>
</table>

**Forest products and services**

Quantity and value of main marketed goods, including NWFP, represent significant income for people in rural areas. The value of main marketed forest ecosystem services, like biodiversity conservation, recreational functions, protective functions, and historical values, cannot be valued separately because of particular calculation forms, but it is displayed like other revenues in forestry enterprises financial balance sheets. Generally, in Serbia, payment for ecosystem services (PES) is not valued and not a part of the calculation for forests benefits.

Based on data for various non-forests goods and products, which are used in Serbia, the most attractive ones are game and game products (trophies, meat, other animal products and game shots) and have a value of more than 18 million US dollars for 2010. In addition, mushrooms, berries, herbs and other plant as well as Christmas trees contribute to the total income with almost 15 million US and 1 million US dollars, respectively. Finally, even wild honey generates an income 15,000 US dollars.

**Contribution of the forest sector to GDP**

According to the Republic Statistics Office, the direct economic contribution of forestry to the GDP in 2015 was 0.24%, and with the inclusion of the forest industry, this figure went up to 2.6%. A more realistic evaluation, considering the important amount of unrecorded (sometimes illegal) production, as well as incentives, in terms of suppressed prices applied to raw wood material sales to the forest industry, might place the forestry’s contribution at around 1.0%. However, this estimate does not take into account the crucial role played by forests in soil conservation, water supply, carbon sequestration, wildlife habitat and maintenance of the country’s remarkable biodiversity, nor forestry’s close relationship with other sectors such as agriculture and tourism.
Trade balance

Trade balance in the forestry sector clearly shows that only in last two years (2014 and 2015), export has exceeded import, which is not caused by increased exports, but by reduced import by almost double (Table 6.12).

Table 6.12 Trade balance in forest products (million US$ value) (Source: Serbian Chamber of Commerce, 2015)

<table>
<thead>
<tr>
<th>YEAR</th>
<th>EXPORT</th>
<th>IMPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Sawmills</td>
</tr>
<tr>
<td>1990</td>
<td>242</td>
<td>79</td>
</tr>
<tr>
<td>1991</td>
<td>171</td>
<td>59</td>
</tr>
<tr>
<td>1996</td>
<td>108</td>
<td>45</td>
</tr>
<tr>
<td>1997</td>
<td>138</td>
<td>63</td>
</tr>
<tr>
<td>1998</td>
<td>132</td>
<td>67</td>
</tr>
<tr>
<td>1999</td>
<td>101</td>
<td>49</td>
</tr>
<tr>
<td>2000</td>
<td>141</td>
<td>57</td>
</tr>
<tr>
<td>2001</td>
<td>120</td>
<td>37</td>
</tr>
<tr>
<td>2002</td>
<td>142</td>
<td>38</td>
</tr>
<tr>
<td>2003</td>
<td>174</td>
<td>42</td>
</tr>
<tr>
<td>2004</td>
<td>256</td>
<td>64</td>
</tr>
<tr>
<td>2005</td>
<td>271</td>
<td>53</td>
</tr>
<tr>
<td>2006</td>
<td>378</td>
<td>61</td>
</tr>
<tr>
<td>2007</td>
<td>570</td>
<td>91</td>
</tr>
<tr>
<td>2008</td>
<td>630</td>
<td>87</td>
</tr>
<tr>
<td>2009</td>
<td>534</td>
<td>57</td>
</tr>
<tr>
<td>2010</td>
<td>589</td>
<td>68</td>
</tr>
<tr>
<td>2014</td>
<td>596</td>
<td>76</td>
</tr>
<tr>
<td>2015</td>
<td>594</td>
<td>70</td>
</tr>
</tbody>
</table>
There is significant potential for expansion of the scope of activities in wood processing and furniture production industry, given that the structure of exports is dominated by products with low added value, while the share of products with high added value is only 26%. The value of exports per worker amounted to 19,000 USD, which is several times lower than in developed EU countries. Therefore, it is necessary to increase the level of finalization of raw material, which would be highly stimulating for the whole field of forestry.

**Illegal logging**

Illegal logging has existed in Serbia for centuries. Reasons for this may be found in the general orientation towards wood and forests as the most accessible resources, which nowadays become a ‘social problem’ or ‘social category issues’. Forest crimes are often underestimated in the legal system and not considered to be in the same category as other legal violations. This mainly appears in under-populated rural areas, and often judges and prosecutors do not take appropriate measures towards legal protection of forests in less developed regions, considering these types of ‘activities’ as a sort of ‘contribution to the rural development’ of the poorer population. Additionally, punishments for illegal activities in the forestry sector are very lenient and very often recorded cases are dismissed when brought to court.

Illegal activities data consists of two data sources: official statistics and the internal data of the Directorate of Forests (DoF), which do not correspond at all. Nevertheless, DoF data shows 5.5 times larger amount of cut wood on an annual level. The discrepancy is mainly in fuel wood where the significant amount has a final destination at a ‘grey zone market’, outside of the legal flow. Beside this figures, sustainability is not jeopardized yet, but the following trend is a concern.

**B6.2.4 Protection of forests and enhancing ecosystem services**

Forests have an important role in meeting challenges to achieve the goal of a self-sustaining economy and re-integration with the community of nations. They are a resource for economic and social development. Their role in conserving soil, water, wildlife and plant and animal genetic wealth and diversity is of vital importance and this is well understood. The multiple roles of forests spanning the entire range of environmental conservation and rational utilization of forest products are crucial for human welfare. They influence and are influenced by development issues such as the creation of employment and the generation of income, the alleviation of poverty, the provision of energy for domestic and industrial use, the supply of essential forest products, and saving and earning foreign exchange. They further influence and are influenced by conservation issues such as agricultural productivity, maintenance of biodiversity and mitigation of greenhouse gas emissions and climatic change. Non-wood forest products such as game meat, deer horns, pelts, forest seeds, fruits, berries, edible mushrooms, honey, cork, resin, moss for pharmaceutical industries and medicinal plants should be also considered as an important resource of economic significance, especially in rural areas.

**Forest health and damage**

Over the past several years, damage by forest fires and disease have varied from year to year. In the year 2012, about 400 fires were recorded, damaging about 13,000 ha of forest; while in 2013 fires damaged about 1,500 ha. Damages caused by insects and diseases varies annually. Damage caused by bigger insects took place in 2014 and 2015 and affected about 340,000 ha and more than 50,000 m³ of wood. Reportedly the protection against insects and diseases has been efficient. Additionally, a strong natural disaster in 2014 (ice) hit forest in the eastern part of Serbia and caused damage to 1.6 million m³ of wood over an area of 43,000 ha. However, under the prevailing hard economic conditions, pest control, forest fire protection, and other combating measures are likely to lose their efficiency.
Natural Resource Management in Southeast Europe: Forest, Soil and Water

Table 6.13 Forest damage in Serbia in the last five years (Source: *Directorate of Forests data, 2015; Serbian Statistical Office, 2014*)

<table>
<thead>
<tr>
<th>Types of forest damages</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>Total for the period 2011-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,000m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human made</td>
<td>24,644</td>
<td>27,199</td>
<td>17,601</td>
<td>26,086</td>
<td>22,892</td>
<td>118,422</td>
</tr>
<tr>
<td>Damages by insects</td>
<td>3,281</td>
<td>2,583</td>
<td>13,056</td>
<td>29,861</td>
<td>32,680</td>
<td>81,461</td>
</tr>
<tr>
<td>Natural disasters</td>
<td>8,141</td>
<td>18,619</td>
<td>29,960</td>
<td>1,607,981*</td>
<td>116,431</td>
<td>1,781,132</td>
</tr>
<tr>
<td>Damages by plant diseases</td>
<td>3,358</td>
<td>5,765</td>
<td>17,556</td>
<td>14,769</td>
<td>13,218</td>
<td>54,666</td>
</tr>
<tr>
<td>Damages by forest fires</td>
<td>24,570</td>
<td>63,118</td>
<td>7,343</td>
<td>10,256</td>
<td>5,059</td>
<td>110,346</td>
</tr>
<tr>
<td>Other**</td>
<td>3,641</td>
<td>0,391</td>
<td>0,258</td>
<td>0,438</td>
<td>1,501</td>
<td>6,229</td>
</tr>
</tbody>
</table>

**Not Theft of forest assortments, illicit pastures, illicit land capture, ecological poisoning and other damage.**

Biodiversity conservation and management

Based on the Nature Protection Service data, 575,310 ha of land (6.5% of the total land area) has been classified as a protected area in Serbia; additionally, 53,804 ha (0.61%) were classified as protected areas in terms of UNESCO MAB and 63,919 ha (0.72%) are under protection because of the Ramsar convention. A large part of these areas consists of forests and forest sites which affects the specific silvicultural treatments applied in the protected area, together with accompanying reduction of harvesting intensity on a much lower level than outside protected areas.

Protected areas comprise national parks, nature parks, the landscape of exceptional features, nature reserves and special nature reserves, natural monuments and protected habitats.

Regarding the implementation of EU nature protection legislation (Natura 2000), activities are ongoing that are part of an IPA (Instrument for Pre-accession Assistance) project. The first results are expected in 2017.

Major challenges in protected areas and biodiversity conservation lay down in facts that in rural areas strong depopulation somehow stultify the efforts of establishing protected areas in sense of ensuring sustainable approach in ecological, economic and social context. In addition, intensive urbanization of protected areas nearby cities slightly starts to jeopardize close to cities protected areas. It is obvious that increasing of the protected areas in Serbia will be particularly in forest areas, which can be in one hand advantage, but also disadvantage, as well.

Forest certification

The Forest Stewardship Council (FSC) certification scheme started to be implemented in Serbia in 2006 and in 2007 (40,000 ha), and during the following period of 5 years, reaches 1,018,822 ha of state owned certified forests in 2011. Private forests and forests in national parks are not jets under certification schemes. There are no other certification schemes areas in Serbia available to date.

B6.2.5 Institutional set-up of the forest sector, legal and policy governance

The forestry sector in Serbia is organised on three levels: on the state level, the Ministry of Agriculture and Environmental Protection / Directorate of Forests are in charge. On the provincial level in Vojvodina, it is the responsibility of the Provincial Secretariat for Agriculture, Water Management, and Forestry. Regional and local levels (operational level) are the responsibilities of public enterprises for forest management; Srbijasume and Vojvodinasume, respectively.

The main duties and responsibilities at the state and provincial levels are prescribed in the Law on Ministries, but also in sectorial laws (see Legal framework for forest policy, below), together with the acts of the Assembly and the Provincial Government. Regarding strategic documents, the main document is the Forestry Development Strategy for the Republic of Serbia, while the National Forestry Program is in the preparation phase.
**Organisation of the forest sector**

The main institutional body responsible for forest policy as well as the legal and administrative affair is the Directorate of Forests, situated in the Ministry of Agriculture and Environmental Protection. Operational and field activities are covered through activities of public forest enterprises, Srbijasume and Vojvodinasume, while the management in national parks is the responsibility of five national parks (Kopaonik, Tara, Fruskagora, Djerdap and Sarplanina). The National forestry program is in the preparation phase and it is expected to be operational by 2017.

**Legal framework for forest policy**

Policy instruments such as legislation and organisations are designed to help achieve the goals of policy. Important forest and forest related laws and regulations in Serbia include:

- Law on Forests (Official gazette of the RS, no: 30/10, 93/12, 89/15).
- Law on Forest Reproductive Material (Official gazette of the RS, no: 135/04, 8/05, 41/09).
- Law on National Parks (Official gazette of the RS, no: 84/15).
- Forestry Development Strategy of the Republic of Serbia (Official gazette of the RS, no: 59/06).
- The national strategy for the inclusion of the Republic of Serbia in the Clean Development Mechanism of the Kyoto Protocol for the sectors of waste management, agriculture and forestry (Official gazette of the RS, no: 8/10).
- Strategy on Biodiversity of Republic of Serbia for the period 2011-2018 (Official gazette of the RS, no: 13/11).
- National Strategy of Sustainable Utilization of Natural Resources and Goods (Official gazette of the RS, no: 33/12).

The Law on Forests establishes the manner and conditions of protection, use, progress and management of forestry and forestland and other potentials of forests (which is the management in the framework of this Act). Parts of the Act are: (I) General provisions, (II) Forest stewardship, (III) Planning, (IV) Forest management, (V) Forest inventory and information system in forestry, (VI) Organization of forest management, (VII) Financing, (VIII) Value of forest, (IX) Chamber of forestry engineers, (X) Forestry affairs, (XI) Property affairs, (XII) Supervision, (XIII) Penalty provisions, (XIV) Transitional and final provisions, and (X) List of forests and forest land.

**Implementation & approximation of EU law**

The Directorate of Forests is the responsible authority in Serbia for the implementation and transposition of EU legal framework (Acquis Communautaire) in the forestry sector. The main constraint and possible problem is the low level of cross-sectorial communication and information/data exchange. Additionally, the entire forestry sector’s administrative section has suffered due to understaffing issues.

Nevertheless, the Directorate of Forests is responsible for the adoption and implementation of EUTR\(^\text{29}\) and FLEGT\(^{30}\), as well as forest reproductive material regulation, while phytosanitary measures are the responsibility of the Phytosanitary Directorate, and Natura 2000 will be the responsibility of environmental sector.

**B6.2.6 Forest knowledge base**

**State of forest inventories**

The last National Forest Inventory was done in 2008 (2006 - 2008), and preparation for next one is currently ongoing. Due to Global Environment Facility (GEF) project, and with the support of FAO (Contribution of Sustainable Forest Management to a Low Emission and Resilient Development), fieldwork for the next FI should likely start in 2017.

\(^{29}\) EUTR - EU Timber Regulation 995/2010/EU

\(^{30}\) FLEGT - Forest Law Enforcement, Governance and Trade; 2173/2005/EC
Educational system & forests

The Faculty of Forestry of Belgrade University provides forestry education at the professional level. The faculty has a four years course, which may be followed as well as postgraduate courses for Master’s and PhD’s. There are four different courses given: (a) Forestry, (b) Landscape Architecture and Horticulture, (c) Technology, management and design furniture and wood product, and (d) Ecological Engineering for Soil and Water Resources Protection.

There are three Forestry Schools (Kraljevo, Sremska Mitrovica, and Surdulica), offering a four-year course at secondary school level, producing middle-level technicians. Also, an additional fifth year is provided for specialization in different subject areas, e.g. hunting. The schools also provide a three-year course to become forest guard and game guards.

There are two research institutes: the Institute of Forestry in Belgrade and the Institute for Lowland Forestry and Environment in Novi Sad.

B6.3 Assessment of the Water sector

B6.3.1 Water resources and policy in the country

The availability of water resources in Serbia is closely related to the climatic conditions especially rainfall and temperature. Unfortunately and because of these aspects, Serbia is not in a too convenient position with regards to the fact that the greater part of Serbia is located in a typical temperate climate continental shelf. Although the amount of precipitation of 734 mm is valuable (especially for agricultural production), a key problem is its uneven annual schedule of precipitation (Water Directorate [WD], 2016). The territory of Serbia has an average flow of 508.8 m³/s, respectively, about 16x10⁹ m³ per year, which represents an average specific runoff of about 5.7 l/s∙km² (Ristić et al., 2011). According to this and based on the annual distribution of surface water of 1500 m³ per inhabitant, Serbia is one of the poorer areas of Europe form the aspect of the availability of water resources. The lowland areas that are the most populated and where soil resources are richest (northern and central Serbia) are poorest in terms of water yield (specific discharges 2-4 l/s∙km²), which is a particular challenge for the water supply.

A significant part of the water supply system in Serbia is based on the use of water from surface reservoirs. The water supply of settlements is based on using local sources of ground and surface water and eventually, a shortfall is resolved by using water from the regional system. This concept of water supply is based on the use of surface water reservoirs in the zone of protected water sources (2 reservoirs under construction and 33 reservoirs planned by 2021) (Water Directorate [WD], 2016).

The problem of flood protection is always topical, even in Serbia, due to the frequent occurrence of extreme water levels in many parts of the hydrological system. Disastrous flooding took place during May 2014, which was the result of extreme hydro-meteorological conditions and caused damage to the flood prevention facility, which led to extremely large losses.

Depending on the hydrologic-hydraulic and morphological characteristics, and sediment regime of the watercourse, as well as the purpose and usage of watercourses and coastal areas in Serbia different objectives, tasks, and necessary measures arise. Dominant measures for protection are classic investment measures, which ensure the safety of the construction works of flow – these measures are defined as excessive. Other sets of complex measures are ‘non-investment measures’ (administrative, regulatory and institutional measures) which by now are so far been poorly represented, but gradually more and more introduced into the application.

The backbone of the existing system of flood protection is ‘passive measures’ (line protection, for example, defensive embankments), while the ‘active measures’ (increase bandwidth waterbeds, retaining part of the flood wave in reserved spaces, directing part of the flood, etc.) underrepresented (Ristić et al., 2012; Water Directorate [WD], 2016).
Strategic management of such complex and fragile natural resource like water demands implementation of strict and clear legal regulations and policies. The main legal document in the field of water management is the Law on Water (Official Gazette of RS, 93/12). This law emphasizes the legal status of water, operational and organisation levels of management and methodological shapes financing activities. This law has defined the occurrence of other legislative areas related to other water sectors like the Water Management Strategy of the territory of the Republic of Serbia, the Law on Emergency Situations and Elements of Methodology for Defence against Torrential Floods.

**B6.3.2 River basin management**

The main principles of river basin management (profile of surface water flows and the management of their catchment areas) are based on the Law on Waters (Official Gazette, No. 30 from No. 93 in 2010 and from 2012) as well as the relevant by-laws.

The previous Law on Waters (Official Gazette, No 46 from 1991) included a strategic and planning document titled ‘Basis of water management’ which represented a long-term plan for the maintenance and development of the water regime on the territory of the Republic of Serbia in one or more areas. The new Law on Waters envisages the development of a water management strategy of the territory of the Republic of Serbia which is currently in the administrative phase of the adoption in the National Assembly of Serbia.

Applying principles and measures, which are defined in the Strategy provides a continuity of the operation of long-term planning of the water sector on the basis of sustainable development. These actions present activities in its core areas (development and use of water, protection of waters from pollution and regulation of watercourses and protection from damaging effects of water), as well as institutions and other necessary tasks and activities for the operation and development (funding, monitoring, etc.). The strategy was adopted for a period of at least ten years.

**Water resources**

Water resources are a fundamental element of the vitality of the infrastructure systems that affect the prosperity of the society. According to the statistical yearbooks, freshwater abstraction and water use in Serbia varies through observed years (Table 6.15). Particularly noteworthy is the year 2013 when the abstraction of surface water was a noticeable largest but an abstraction of underground water among the lowest.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh surface water abstracted</td>
<td>3,731</td>
<td>3,411</td>
<td>3,715</td>
<td>2,924</td>
</tr>
<tr>
<td>Fresh groundwater abstracted</td>
<td>502</td>
<td>507</td>
<td>478</td>
<td>459</td>
</tr>
<tr>
<td>Total freshwater abstraction</td>
<td>4,012</td>
<td>3,680</td>
<td>3,982</td>
<td>3,166</td>
</tr>
<tr>
<td>Total water use</td>
<td>8,245</td>
<td>7,598</td>
<td>8,175</td>
<td>6,549</td>
</tr>
</tbody>
</table>

**River basins and topography**

Rivers in Serbia belong to the territory of three major recipients: the Black Sea (Danube Basin), the Adriatic Sea, Drim and Plavskia River and the Aegean Sea (Pčinja, Dragovištica, and Lepenac). The Danube basin with an area of 8,170 km² and the average flow at the confluence at the Black Sea of 6,500 m³/s is the second largest river in Europe. Coming from Hungary to Serbia the Danube collects several main tributaries: the Drava, Tisa, Sava and Velika Morava. The biggest tributary to the left side of the Danube is the Tisa (1,572 km²); it enters the territory of Serbia from Hungary and in the Danube confluence forms a vast alluvial plain. The right tributary of the Danube, the Sava, is the largest river that joins the Danube on the territory of Serbia. The area of its basin is 96,400 km² and has a length of 206 km on the territory of Serbia where also a large alluvial plain is being formed. This part of the Danube basin in Serbia represents a significant continental lowland area of the Pannonian Plain with a smaller number of isolated island’s
mountains (Fruška Gora, Vrsac mountains, Cer, Avala). The tributary on the right side of the Danube - the Great Morava River (37,400 km²) is formed by the joining South Morava River (15,400 km²) and West Morava River (15,680 km²). The basin of the River Velika Morava is characterized by a complex geomorphological characteristics, with Dinarides Mountain on the west and the Carpatho-Balkan Mountains on the east, while in the central part of the basin dominates Serbian-Macedonian mountain massif. Bell Drim (4,732km²) and River Plavska (272km²) drain in the direction of the Adriatic Sea. From the river basin of the Aegean Sea, the most important is the Lepeňac, the left tributary of the Vardar, which rises on the northern slopes of the Sharr Mountains. The area of its basin on the territory of Serbia is about 650 km².

River basin management plan and implementation

According to the ‘Law on Waters’ 2016 (final version: Official gazette 93/12) a draft ‘Water Management Strategy’ in the Republic of Serbia has been prepared, and is currently in the stage of adoption. One of the structural elements of the strategy is considered to be the evaluation of the current situation of water management as well as the objectives and guidelines for water management. The strategy projects the development of water management and provides measures for the implementation of established goals of water management for the period of twenty years (until 2034). During this period, a significant improvement in the water sector in accordance with social and economic opportunities is expected. The strategy emphasizes that its main aim is reaching EU standards in the area of water, but also notes that a period of 20 years insufficient time for reaching all the standards that apply to the EU Member States. The highest level of compliance is expected in the part of water activities that are related to the use of water for human consumption: reaching the prescribed standards in the part that relates to the protection of water requires accordingly a period longer than twenty years.

B6.3.3 Flood management

Mountain hazard related to water (torrents, landslides)

In Serbia, torrential floods are the most common occurrence in the field of natural risks. Distribution of the torrential streams with various levels of destructiveness is generally located in the south of the Sava and Danube rivers but also a few of them occur in Vojvodina (Fruška Gora, Vršac, and Titelski bank). Erosional processes, as one of the factors of torrential floods, affect 75% of the territory of Serbia with an average annual production of erosion material from 30 million m³, of which about 8 million m³ reaches the river and stream beds (WBIF, 2015).

From the 1950’s to the 1990’s numerous anti-erosion and torrential works were conducted that had very significant direct and indirect effects. In addition, anti-erosion and torrential works significantly reduced the sediment transport in most of the hydrographic network of the area of Serbia. However, over the last 20 years a lack of works and preventive measures related to the concept of integrated development of torrential basins has been noted, which includes technical (construction of the barrier, regulation, storage reservoirs, retention ponds, coastal defence), biological (afforestation, land reclamation of degraded forests), and administrative measures (rules of development and use of endangered catchment area).

According to recent research, 30% of Serbia’s territory is threatened by landslides or some kind of terrain rock fall, which affects more than 40,000 locations (only in the territory of Belgrade have municipalities recorded more than 1,100 landslides). The occurrence of landslides was especially intense after a series of floods in 2012 and 2014.

History of floods and consequences

Among natural hazards with serious risks for people and their activities, the torrential floods represent the most common hazard in Serbia. Within the context of climate change in the last ten years, Serbia is exposed to more torrential floods causing huge damage and loss of human lives. According relevant papers (Ristić et al., 2012), Serbia has had more than 10,000 torrents with disastrous consequences which were registered. Among these, the total number of human victims was over 180 - the average is nearly 4 victims per event torrential floods. A more detailed overview is provided in Table 6.15.
Table 6.15 Major flood events in the 2000 - 2015 period (Sources: Statistical yearbooks of Serbia for period 2002 – 2014)

<table>
<thead>
<tr>
<th>Date</th>
<th>Affected areas, municipalities</th>
<th>Extent of damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2002</td>
<td>Southern and central parts of Serbia: Grdelica, Vranje, and its surroundings, Jagodina, Paraćin, Krupaja, Svilajnac, Despotovac</td>
<td>252,000ha flooded by outside waters, 227 settlements endanger.</td>
</tr>
<tr>
<td>March–June 2005</td>
<td>Southern parts of Serbia and Belgrade surroundings: Bela Crva, Barajevo, Ripanj, Leskovac, Jelašnica, Leskovac, Lebane, Osečina</td>
<td>700,000ha flooded by surface, ground and torrent waters, 227 settlements endanger.</td>
</tr>
<tr>
<td>November 2009</td>
<td>Southwestern parts of Serbia: Prijeponje, Nova Varoš, Priboj, Arilje, Novi Pazar, Sjenica, Užice</td>
<td>33,000ha flooded, 56 settlements endanger.</td>
</tr>
<tr>
<td>February 2010</td>
<td>Eastern and central parts of Serbia: Zaječar, Aleksinac, Požega and Knjaževac, Negotin, SvrlijgBoljevac; Merošina, Doljevac, Koceljeva, Ub, Lajkovac, Lijg, Vladimirci, Žitorađa, Priboj and Prijeponje</td>
<td>1,306 households damaged, more than 3,150 people affected.</td>
</tr>
<tr>
<td>September 2014</td>
<td>Eastern Serbia municipalities of Kladovo, Majdanpek, and Negotin</td>
<td>Approximately 7,000 people affected.</td>
</tr>
<tr>
<td>May 2014</td>
<td>Western, South-western, central and Eastern Serbia: Sava, Tammava, Kolubara, Jadar, Zapadna Morava, Velika Morava, Mlava and Pek at BeliBrod on the tributary river Kolubara – Obrenovac</td>
<td>1,525 million euros lost equal to about 3% of the GDP, 9,100 km² and 38 municipalities affected, 1.6 million people affected, 51 lives lost.</td>
</tr>
</tbody>
</table>

**Flood risk management plan**

Because of the current water legislation in place and as part of the planning documents required, the following plans were created in Serbia: plans of flood risk management, a general and operational plan for flood protection, and the plans regulating the protection of water (plan for water pollution protection and monitoring program). These plans provide a system of measures and activities for flood protection, protection from erosion and torrents and elimination of the consequences of such effects of water (WBIF, 2015). The preliminary flood risk assessment is prepared for the whole territory of the Republic of Serbia and contains:

1. Maps of the river basin areas in the appropriate scale, with bold borders of sub-basins, topography and land use are shown.
2. A description of the history of floods which have had significant harmful consequences on human health, the environment, cultural heritage and economic activity and the possibility of occurrence of similar events in the future, which could have similar consequences.
3. Assessment of potential harmful consequences of future floods to human health, the environment, cultural heritage and economic activity, taking into consideration the topographical, hydrological and geomorphological characteristics and position of watercourses, including floodplains, the effect existing facilities for flood protection, the position of populated areas and industrial zones, plans for long-term development and climate change impact on occurrence of floods.

The management plan for flood risks for the entire territory of Serbia was created by the responsible Ministry while plans with more detailed informational and spatial resolution (water catchment areas – a total of 7 water areas) were made by different Water Management Companies: WMC “Waters of Vojvodina” for river areas in Bačka, Banat and Srem, WMC “Beogradvode” for the river area of Belgrade Municipality, and WMC “Srbijavode” for river areas that are in the lower parts Danube, Sava and Morava. The area and facilities protected between 2011 and 2014 against floods are presented in Table 6.16.
Table 6.16 Area and facilities protected against floods (Sources: Statistical yearbooks of Serbia for years 2011, 2012, 2013 and 2014)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area protected against floods (thousands ha)</td>
<td>958</td>
<td>1,469</td>
<td>1,249</td>
<td>1,326</td>
</tr>
<tr>
<td>Utilised agricultural land (thousands ha)</td>
<td>1,709</td>
<td>1,260</td>
<td>1,089</td>
<td>1,156</td>
</tr>
<tr>
<td>Settlements, number</td>
<td>644</td>
<td>716</td>
<td>603</td>
<td>833</td>
</tr>
<tr>
<td>Industrial facilities, number</td>
<td>481</td>
<td>586</td>
<td>506</td>
<td>666</td>
</tr>
<tr>
<td>Railway lines, roads, (km)</td>
<td>5,871</td>
<td>3,122</td>
<td>2,857</td>
<td>4,749</td>
</tr>
<tr>
<td>Total length of embankments (km)</td>
<td>3,446</td>
<td>3,458</td>
<td>2,884</td>
<td>3,247</td>
</tr>
</tbody>
</table>

**B6.3.4 Water quality**

*Classification of the ecological state of water bodies*

For the purposes of planning measures, which have the ultimate aim of preserving or reaching a certain surface water status, water bodies were established in order to clearly define spatial elements of surface water that have approximately uniform characteristics. Water bodies are established on watercourses’ basins with an area of more than 100 km² and on all major interstate water streams, regardless of the surface of the basin (AEP, 2015a). A total of 499 water bodies were identified, of which 492 are located in the Danube basin. Of the total number of surface water bodies, almost 70% (342) are characterized as natural watercourses (mostly rivers), 16 are artificial bodies of water, while the rest (28%), due to the significant hydro-morphological changes, are preliminarily assessed as significantly modified water bodies. As the territory of Serbia is relatively poor in regards of natural lakes, only 5 water bodies were defined as still water (natural and artificial lakes). The chemical and physical quality of the established water bodies is the starting point of most planning documents. Responsible institutions for the implementation of water quality monitoring are the Agency for Environmental Protection, a body within the Ministry and Republic Hydrometeorological Service of Serbia (AEP, 2015b).

The classification of ecological status and ecological potential is determined based on the following parameters: biological, physico-chemical, hydromorphological and microbiological. Based on these criteria, water bodies are classified into five classes: (I) excellent (II) good, (III) moderate, (IV) bad, and (V) poor.

*A map of the monitoring network*

A regulation (Official Gazette of RS, No. 112/09) defines several indicators for water quality: an indicator of consumption of oxygen in surface water, nutrients in surface and ground waters and saprobity index. Especially important is the Serbian Water Quality Index (SWQI), which is actually a composite indicator. SWQI is obtained by aggregating nine parameters of physico-chemical and microbiological parameters of water quality (AEP, 2015b).

Data on water are given on the basis of daily monitoring and the water level of underground waters on the basis of five and ten-day measurements during a month. According to the regulations relative to the meteorological and hydrological stations' network, measurement and collection of these data are carried out through the Republic Hydrometeorological Service of Serbia.

*Surface water (ecological and chemical status)*

The condition of surface water quality has been systematically monitored at about 140 stations covering 103 of about 500 water bodies prescribed by law. The assessment of surface water quality was carried out by reviewing the average balance of their quality and the observed long-term trends. During these processes, primary attention is paid to the parameters that have the character input indicator of pollution in surface waters originating from various groups of pollutants. Based on available data, the classification was made for 103 water bodies that have a network of monitoring stations of surface water quality (AEP,
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Large bodies of water streams, primarily the Danube, Tisa, Sava, and Drina, in general, satisfy the criteria for the quality class, being graded as ‘(II) good’. An exacerbated state regarding the quality of some water bodies was registered mainly in smaller streams and canals in Vojvodina, as well as near larger settlements.

**Groundwater (chemical and quantitative status)**

The status of the ground water is determined by the quantitative status and the chemical status. The good quantitative status of the groundwater is achieved when the average abstraction of groundwater exceeds available groundwater resource, there is no trend decline in groundwater levels as a result of abstraction and there is no threat to surface water-dependent ecosystems. Karst areas have particular importance from the aspect of groundwater quality, then alluvial, and first aquifer, which are the most exposed bodies to anthropogenic impact. The assessment of the quality status of groundwater resources has been done on the basis of available data from relevant ministries, the results of their monitoring, technical documentation and the results of the conducted activities and individual surveys.

The natural groundwater quality in Serbia is quite varied which is a result of various mineralogical-petrographic composition of the geology, the genesis of groundwater and aquifers, water age, varying intensity water change and ranges from exceptional quality that does not require treatment as compared to waters that require very complex procedures of conditioning before being used as water for the public water supply. Furthermore, the analysis showed that 34 water bodies (23%) are at risk or possibly at risk, while for 119 water bodies (around 77%) can be considered as not being, or, probably not being at risk (AEP, 2015a; AEP, 2015b). Dominant pressures that are believed to cause bad chemical status of water bodies are agricultural activities and unregulated sewage networks of urbanized areas, as well as another negative impact that should not be ignored, namely municipal and industrial waste dumps, which can cause significant pollution to groundwater locally.

**Waste water treatment and reuse**

Untreated municipal and industrial waste water are key sources of pollution of the surface and groundwater in the Republic of Serbia. In Serbia, only 5 - 10% of the waste water is processed while more than 50% of industrial facilities do not purify waste waters due to a lack of proper equipment. Especially problematic is the territory of Belgrade with over two million inhabitants, and which still has no plants for purification of communal waste waters flowing into the Danube (CEDF, 2015).

Only 20% of the municipalities have facilities for purification of communal wastewaters while the main urban centres (such Novi Sad and Niš) still have no such systems for wastewaters treatments. Activities of local government regarding the determination of the composition and the amount of wastewater are also unfavourable. A large number of Public Utility Companies do not fulfil the legal obligation in terms of reporting their emissions. The report on wastewater from 2012 contained only information from 23 out of 178 public utility companies and their water supply and sewage, which is absolutely unsatisfactory. On the basis of such a small number of reports submitted a relevant overview of the state of municipal wastewater cannot be given (CEDF, 2015; AEP, 2015b). The quantities of municipal waste and wastewater in the Republic of Serbia so far are mainly estimated, due to lack of reliable data. All in all, there is a notable relative increase in the total discharged water from settlements and industry, which is not followed by the amount of treated wastewater that has actually been decreasing over the years (Table 6.17).

<table>
<thead>
<tr>
<th>Table 6.17 Wastewater treatment and reuse in the 2011-2015 period (Sources: Statistical yearbooks of Serbia for years 2011, 2012, 2013 and 2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total discharged water (million m³)</strong></td>
</tr>
<tr>
<td>------------------------------------------</td>
</tr>
<tr>
<td>- from settlements*</td>
</tr>
<tr>
<td>- from industry</td>
</tr>
<tr>
<td>Treated wastewater (million m³)</td>
</tr>
</tbody>
</table>

* From municipality with and without public sewage system.
B6.3.5 Water demand

Water supply

The situation regarding the water supply is different for each area, both in terms of the development of infrastructure and the level of coverage of the population, as well as to the reliability of water supply (time, quantity and quality). This is a result of the varying density, level of economic activity and available water sources, system losses and other factors. According to the statistical yearbooks, recent facts about water supply in Serbia are presented in Table 6.18.

The percentage of the population connected to the public water supply systems has been growing over time. In Serbia in 2000, excluding Kosovo* there was about 76%. Today, it reaches more than 80%. There is a further trend of increase regarding connection, a consequence of the migration of people from the countryside to the city. The largest percentage of connections (over 90%) has been achieved in Vojvodina and Belgrade, which both support the construction of water supply infrastructure in these and other areas. However, the fact is that in central Serbia there are some larger settlements that do not have public water supply systems.

<table>
<thead>
<tr>
<th>Total (thousand m³)</th>
<th>To households (thousand m³)</th>
<th>To industry (thousand m³)</th>
<th>To other consumers (thousand m³)</th>
<th>Total water losses, (thousand m³)</th>
<th>Number of households connected to the water supply system</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,012,220</td>
<td>319,882</td>
<td>348,043</td>
<td>112,336</td>
<td>220,824</td>
<td>2,161,182</td>
</tr>
</tbody>
</table>

Water scarcity and droughts

In the light of climate change, Serbia is threatened by the emergence of dry periods during the year as recorded in recent history which can also be expected in the future. To decrease the negative effects of drought, particularly those that affect agricultural production, water management must be carried out primarily on the basis of continuous research of changes in the cycle of rainfall and evapotranspiration using modern methods (satellite images, scenarios of vegetation, development of measurement and prediction and the similar). The next step should be defining the ecological requirements and develop management plans for drought periods vulnerable basins as well as clearly defined conditions for the declaration of drought and lack of water to the system of measures for response through adaptation activities in the new situation.

Irrigations

The first large irrigation systems were built in the 1930’s, while a significant irrigation development was created after the Second World War, namely after the construction of Danube-Tisa-Danube canal. Economic problems in recent years, among other things, caused stagnation in the field of irrigation.

The territory suitable for irrigation in Serbia covers an area of about 1.9 million ha. The publicly owned hydro system for irrigation has been built on an area of about 105,500 ha, which is less than 6% of the land that has favourable characteristics for irrigation. However, due to inadequate maintenance and neglect from the owners and users, these systems serve only a much smaller area. It is estimated that the irrigation covers less than 42,000 ha with total water use of 61x10⁶ m³.

The largest systems are to be found on the territory of Vojvodina an area with high-quality agricultural land and significant quantities of transit waters (the Danube, Sava, and Tisa).
B6.3.6 Institutional set-up of the water sector, legal and policy governance

Organization of the water sector

Water management in Serbia (see Figure 6.1) is under the authority of the Department of Protection of Water within the Republic Directorate for Water of the Ministry of Agriculture and Environmental Protection (OG, 2005). The Ministry of Agriculture and Environmental Protection and its operational body, the Directorate for Water are responsible for the development of legislation, water management policy and strategy, preparing flood risk management plans, action plans and coordinating with the concerned actors. Operational organization is organized within three basic territorial segments: the Public Water Resources Management Enterprise (PWRME) ‘SerbianWaters’ (founded in 1996) which is responsible for the area of Serbia without the Autonomous Province (AP) Vojvodina and the administrative area of Belgrade, PWRME ‘VojvodinaWaters’ (founded in 2002) responsible for the area of AP Vojvodina and PWRME ‘BelgradeWaters’ (founded in 2008) responsible for the administrative area of Belgrade. The PWRMEs are in charge of water management, construction, maintenance and management of facilities for flood protection, erosion and flood control and development of technical documents and designs. They are also responsible for flood hazard and risk mapping and for the flood and ice defence management in coordination with the Republic Hydro-meteorological Service, municipalities, land owners, etc. PWRME ‘SerbianWaters realises its activities through the Water Resources Management Centre (WRMC) ‘Sava-Danube’ with its headquarters in Belgrade, and the WRMC ‘Morava’ with headquarters in Niš, which carries out their activities through local water resources management enterprises. The PWRME ‘VojvodinaWaters’ has no smaller organisational units and its activities are carried out directly through local water resources management enterprises.

In addition to what was said previously, the following authorities are responsible with regards to flood management: Republic hydro-meteorological service, Sector for Emergency Management (Protection & Rescue Sector & Civil Protection Sector) and the Local authorities. The Flood Affected Areas Assistance and Rehabilitation Office (FAAARO) is also tasked with flood prevention-related issues. The Public Water Companies have to provide staff, equipment, and ensure technical conditions for defence activities. The Serbian Environmental Protection Agency (SEPA) prepares reports and assesses the state of water quality in accordance with national and EU regulations. SEPA establishes and maintains a database of water quality.
and sets up and maintains a network of monitoring stations for water quality. The International Sava River Basin Commission manages projects related to the Sava and facilities the communication among the countries of the Sava Basin. Serbia is also a full member of a similar international cooperation in the Danube Basin under the auspices of the International Commission for the Protection of the Danube River (ICPDR) targeting trans-boundary water management in the Danube River Basin. Priorities of the initiative include improving the environmental emergency warning system, flood forecasting, monitoring the network and the information system as well as sustainable flood prevention, and risk management.

**Legal framework**

The basic legal document in the field of water management is the Law on Water (“Official Gazette of RS”, no. 93/12), that regulates “the legal status of water, integrated water management, management of water facilities and water land, sources and methods of financing water activities as well as and other issues of importance to water management”. In addition to the Law on Water, other laws related to water sector are: the Law on Emergency Situations (Fig. “Official Gazette of RS”, no. 93/12), the Law on Environmental Protection (“Official Gazette of RS”, no. 14/2016) and the Law on Meteorological and Hydrological Activities (Official Gazette of RS” No. 88/2010).

The necessary preconditions for the implementation of the Law on Water are the adoption of bylaws, taking into account the relevant EU directives. According to the Law on Water, 30 bylaws were adopted, of which 13 ordinances, 8 regulation, several decisions, and ordinances, as well as the Operational Plan for Flood Control for the current year. The legal acts of particular importance are: the Regulation on the Annual Program for Monitoring over the water status, and the Regulation on the Program for Water Management, that are adopted each year, and the following ordinances: Ordinance on determining the methodology for the preparation of the preliminary flood risk assessment; Regulation on the content and application form for the issuance of water acts and contents regarding the procedure of issuing the water requirements; Regulation on the condition and criteria for the allocation of resources and methods of allocation of funds aimed to finance the operations of general interest in water management.

Strategic, planning and normative activities that are the basis for water management in the territory of the Republic of Serbia are defined by the Law on Water. Harmonisation of these and other strategic and planning documents, adopted at the national level are required and refer to: the National Strategy for Sustainable Development (2009 - 2017), the Spatial Plan of the Republic of Serbia (2010 - 2020), the National Environmental Protection Programme (2010 - 2019), the Water Master Plan for Serbia (2002 - 2012), and the National Strategy for Sustainable Use of Natural Resources (2012 - 2022).

**Implementation & approximation of EU law**

The National Environmental Approximation Strategy – NEAS (“Official Gazette RS“ No. 80/2011), the Approximation Strategy in the Water Sector, a sector supplement to the NEAS (April 2012) and the National Programme for Adoption of EU Acquis NPAA (Office for European Integration, July 2014) have also transposed the requirements of the Water Framework Directive and Flood Directive. The National Water Management Strategy addresses flood management in separate relevant chapters; however, its development is still in progress.

Although several legal regulations on water are currently in effect, the transposition of the EU legislation has not been fully achieved. The relevant pieces of legislation fully complying with the Water Framework Directive and the Flood Directive are under process of preparation and harmonization. The adoption of the National Water Management Strategy is expected in 2017. The enforcement of legislation is relatively strong; new regulations will also be applicable according to the new legislation. The enforcement of the legislation on the use of flood ways and flood areas is not at a sustainable level yet due to construction, mining, waste management and property issues.

As important requirements of the Flood Directive, preliminary assessments have been carried out in the country. Detailed flood risk and flood hazard maps were prepared under the ICPDR initiative for the Morava and Danube River Basin and within other projects. Maps were produced for 27 flood basins out of the total 99 identified as areas of potential significant flood risk.
B6.4 Assessment of the soil management

B6.4.1 Status of the soil data

The share of agricultural land in the territory of the Republic of Serbia is 60.2% and in the territory of Vojvodina, 82%. The structure of agricultural land, by category of use, has a high share of arable land (83%). Over the past fifteen years, the share of agricultural land has reduced by 10.6%, while the share of arable land has reduced by 10%. In terms of the purpose of use of agricultural land, the disappearance was greatest in terms of vineyards (20.7%) and least in terms of fisheries, reeds and marshes (2.5%). In terms of area, 179,036 hectares or 18% of pastures disappeared over the past fifteen years. It is important to note that ploughed fields and gardens in Serbia cover 3,355,000 hectares, which make up 79% of the total arable land. This is complemented by additional about 312,000 hectares of orchards and vineyards and about 587,000 hectares of meadows. The area that is not cultivated is about 855,000 hectares (pastures, reeds, marshes and fisheries).

Nowadays, all types of soil degradation are present in Serbia such as degradation of soil physical properties (compaction, loss of the structural stability), chemical (salinisation, acidification, and nutrient depletion), biological degradation and soil loss (due to soil erosion and landslides).

The factors of degradation of soil in Serbia include: permanent loss of agricultural land (mostly due to the following reasons: growth of settlements, industrial, mining, power generating and transport developments, water erosion, wind erosion, salinisation of soil, loss of nutrients, chemical pollution from bio-industrial sources, mechanical compaction of soil under the impact of heavy machinery, turning of soil into marshes, floods, loss of soil fertility, etc.).

B6.4.2 Monitoring of soil

Status of soil

The land cover of the Republic of Serbia is characterized by a large number of systematic units, which have arisen as a result of a variety of conditions and development of land. Soil genesis and evolution in Serbia have been crucially influenced by the land relief and its variable petrographic composition. A wide diversity of soils form through the long and complex process in a variety of geological, climate, water, and vegetation conditions.

In Serbia the following well-developed soil classes could be distinguished: cambisols (districambisols 32%, eutricambisols 5,5%), chernozem (15%, the most fertile land, located in Vojvodina on the surface around 1,000,000 ha, while in other parts of Serbia is present at about 200,000 ha), vertisols (8,5%), ranker (7,4%), pseudogley (6,3%), podzols, terra rosa, wetlands, salty soils etc.(Ličina et al, 2011).

The general distribution of soil classes in Serbia is based on the character of its natural humidification, respectively, on the water-physical properties of the land includes three large groups: automorphic soil - 6,222,350 ha (80%), hydromorphic soil - 1,445,555 ha (19%) and halomorphic soil - 79,360 ha (1%). The soil map is attached in Annex.

Indicators for assessing the risk of land degradation

According to the Regulation on the Programme for the Systematic Monitoring of the Soil Quality, soil degradation risk assessment indicators and a methodology for the development of the remediation programmes (“Official Gazette of RS” no. 88/10), indicators for evaluation of risks from soil degradation were defined as follows:

1. Degree of endangerment of land from erosion;
2. Degree of endangerment of land from loss of organic materials;
3. Degree of endangerment of land with risk from land compaction;
4. Degree of endangerment of land from salination and/or equalization;
5. Degree of endangerment of land from slides, except slides, which can be created by mining
activities during for the duration of activities;
6. Degree of endangerment of land from acidification;
7. Degree of endangerment of land from chemical pollution.

The selection of indicators for assessing the risk of land degradation is performed on the basis of the expected condition or results from previous studies. Indicators for assessing the risk of degradation are evaluated on the basis of general elements for the assessment of land degradation, which are given in the Annex of the Regulation. The degree of threat from chemical pollution of land is determined on the basis of the limit values and remediation of pollutants specified in the Regulation. Data collection and production of indicators related to soil erosion and the content of organic carbon in the soil need to be harmonised with the methodology outlined in the Technical Instruction for Data Collection for Soil Erosion and Data on Organic Carbon in the Soil for Europe through the EIONET network.

B6.4.3 Soil degradation

Erosion

Geomorphological features of the Serbian territory are strongly related to water erosion predominating in the southern region and wind erosion in the northern plain. The further review of erosion problems relates to the soil erosion by water. Water erosion depends on a number of physical-geographical and anthropogenic factors such as parent material, composition relief, climate, vegetal cover (land use). As a consequence of such natural conditions, practically all of the territory of Serbia is under erosion processes of different intensities (from low to the excessive erosion). The share of certain categories of erosion intensity, i.e. erosion intensity in the stream channel and in the watershed, according to S. Gavrilović’s classification, has been analysed based on erosion maps prepared using the Erosion Potential Model given in the annex (Gavrilovic, S., 1972) (Table 6.19).

Water erosion causes great damages such as soil loss, water loss, loss of nutrients, disturbance of runoff regime in the watersheds, catastrophic floods, reservoirs siltation, etc. Damage initially caused by erosion is the loss of the upper fertile soil horizon, coupled with a loss of organic and mineral nutrients from steep and ploughed land, leading to inadequate air and water relations in the soil. The damage caused by water erosion results from detaching and transporting the fertile soil horizon from the slopes, as well as through torrential flows. Erosion removes organic and mineral nutrients from the topsoil, causing the soil structure to become destroyed, leading to the disturbance of soil characteristics of air and water relationship.


<table>
<thead>
<tr>
<th>Category</th>
<th>Erosion Processes Intensity</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>km²</td>
<td>%</td>
</tr>
<tr>
<td>I</td>
<td>Excessive Erosion</td>
<td>2,888.0</td>
</tr>
<tr>
<td>II</td>
<td>Intensive Erosion</td>
<td>9,138.0</td>
</tr>
<tr>
<td>III</td>
<td>Medium Erosion</td>
<td>19,386.0</td>
</tr>
<tr>
<td>IV</td>
<td>Weak Erosion</td>
<td>43,914.0</td>
</tr>
<tr>
<td>V</td>
<td>Very weak Erosion</td>
<td>13,035.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>88,361.0</td>
</tr>
</tbody>
</table>

Sediment transport related to gross erosion (total erosion production), is also considerable. Total average annual gross erosion in Serbia amounts to 37,249,975.0 m³, i.e. specific annual gross erosion amounts to 421.57 m³·km⁻² while annual sediment transport is 9,350,765.00 m³ and specific annual sediment transport is 105.80 m³·km⁻². If annual gross erosion is turned into equivalent hectares of soil 20 cm thick, it can be concluded that every year 20,525 ha is endangered.
Land cover and changes in land use

Besides natural conditions and processes, the characteristics of the land and its degradation are significantly affected by the constant pressures of human activities, including the development of settlements, infrastructure systems, extraction and use of resources, agriculture, forestry, use of chemicals, etc.

Land use change is one of the indicators for monitoring the status of the land. The indicator is calculated by analysing maps based on images from the Landsat satellites CLC (Corine Land Cover) base for 1990, 2000 and 2006, i.e. on the basis of the trend of increase in surface area which changed the purpose of land use in a certain period of time (5 - 10 years) on the basis of the CLC database changes (Table 6.20).

The analysis of the Corine Land Cover database for 2012 shows the presence of 29 out of 44 classes of CLC nomenclature. Agriculture is a dominant category with over 55% of the entire territory of the country. Forest and semi-natural areas cover around 40% of the country (broadleaves forest – 27%). Land classified as artificial surface covers almost 3.6% of the territory, and the rest of approximately 1.6 % is classified as humid areas and water basins.

The Environmental Protection Agency (EPA) is monitoring indicators of land use changes. The EPA is legally covered by national and international regulations and report to the European Agency for Environmental Protection (EEA) - Indicator CSI 014 - Land take; UNECE - Indicator E21 - Land uptake.

Decline of organic matter and biodiversity

In Serbia, a systematic assessment of organic matter reserves in soils has not yet been carried out been done yet. The results of the analysis carried out by the Provincial Department of Agriculture in 2002 - 2006 in the territory of Vojvodina show that the humus content of arable land is above 3%. The results of the analysis of humus, made in 2008 in Vojvodina, show that humus content has the average value of 3.16%. The results of the analysis of humus content in Central Serbia in 2008, indicates that 49.9% soil has low (1 - 3%) to moderate humus content (3 - 5%). Based on the recommendations and procedures set out in the Proposal for a Directive of the EU, it is necessary to establish a measurement program to mitigate or prevent organic matter decline. Countries with inadequate datasets regarding the organic matter in the soil should immediately implement sampling programs to determine the baseline status of the organic matter in the soil.

Organic carbon content in the soil

The land is the main terrestrial reservoir of carbon, even small carbon stock changes may affect the overall carbon balance in terrestrial ecosystems. The organic carbon content in the topsoil (0-30 cm depth layer) in the territory of Serbia is $705.84 \times 10^{12}$ g (Tg).

In 50% of the territory of Serbia, soil organic carbon stored in the topsoil is up to 2%. Organic carbon stock
in the topsoil (0 - 30cm) is 40.71% higher in forests and semi-natural areas compared with agricultural land.

An indicator of the content of organic carbon in the soil is calculated on the basis of information on the content of organic carbon expressed in t/ha and in %, for the topsoil layer of 0 - 30 cm and a layer of 0 - 100 cm. A list of accepted pedotransfer function for determining bulk density necessary for determining the content of organic carbon in the soil is available in the Technical guidelines for the collection of soil erosion and soil organic carbon data for Europe through EIONET, (European Commission, 2010).

The analysis of samples obtained from agricultural land in 2013 during a systematic control of agricultural soil fertility, indicates that the majority of samples (54.21%) had a low organic carbon content (1.1 - 2%), middle organic carbon content (2.1 to 6%) had 32.96% of the samples, while a very low content (<1%) had 12.83% of the samples. Reserves of organic carbon in the soil on the basis of land use at a depth of 0 - 30 cm are shown on the map in the annex.

Management of contaminated sites

Localised pollution is linked to areas of increased industrial activity, inadequately regulated landfills, mineral extraction sites, military warehouses, and areas where there has been accidents and pollution of land. The management of contaminated sites can be done based on indicators (list of indicators related to land). Since 2006, the Agency for Environmental Protection has begun to develop a national inventory of contaminated sites. On the territory of Serbia, 422 sites are identified, of which 366 sites are potentially contaminated.

According to the Inventory of Contaminated Sites, in 2013 (see Figure 3), public municipal landfill sites occupied the largest part of the total sites (43.13%), followed by industrial and commercial sites (36.30%), and industrial waste landfills (10.43%). The territory of Serbia has 3,251 illegal landfills, mostly located in rural areas. A database of potentially contaminated and contaminated sites in the industry includes 222 sites, and the largest contribution to localised pollution of land has oil industry (41.89%), followed by the chemical industry (14.41%), metal industry (11.71%), power plants (8.57%) and mines (4.50%) (Vidojević et al, 2015).

The annual national costs for managing contaminated sites in the EU amounted to 10 euros per capita, and in the Republic of Serbia, it is 40 euros per capita.
B6.4.4 Institutional set-up concerning soil management, legal and policy governance

Organization of soil management

The soil protection authority in Serbia is the Ministry of Agriculture and Environmental Protection (MAEP). In 2009, the Directorate for Agricultural Land was established in the MAEP, which is according to the Law on Agricultural Land, responsible for performing tasks regarding protection, development, and use of agricultural land and the management of agricultural land owned by the state. This body consists of five organizational units, and one of them is the Department for the Protection and Development of Agricultural Land.

MAEP is responsible and involved in the protection and improvement of the environment; inspection in the area of environmental protection; environmental protection; air protection; climate changes; water pollution protection in order to prevent deterioration of the quality of surface and groundwater; protection of land from pollution, management of chemicals and biocide products and others.

The Serbian Environmental Protection Agency (SEPA) was established in 2003 as a body within the MAEP responsible for professional activities related to the development, coordination and management of the national information system for environmental protection (monitoring the state of environmental factors through environmental indicators, preparing the registry of pollutants, etc.); implementation of the national monitoring of air, water, land and other resource quality; the collection and compilation of environmental data, processing and preparation of environmental condition reports and implementation of environmental policy; cooperation with the European Environment Agency (EEA) and the European Network for Information and Observation (EIONET), as well as other duties specified by law.

Legal framework

The laws which regulate the area of land resources in Serbia are primarily the Law on Land Protection (OG of RS, No. 112 / 15), the Law on Agricultural Land (OG of RS, No. 112/15), and the Law on Environmental Protection (OG of RS, No 43/2011).

The Law on the Land Protection is the most important law in the field of land resources that regulates the protection, systematic monitoring, remediation, re-cultivation, inspection, and other issues.

On the basis of the Law on Environmental Protection, the Serbian government adopted a Regulation on the program of systematic monitoring of soil quality, indicators for risk assessment of the soil degradation and a methodology for the development of remediation programs (OG of RS, No. 88/10).

Ordinance on the content and method of environmental protection information system management (OG of RS, No 112/09) provides the basis for the Regulation on the National List of Indicators of Environmental Protection (OG of RS, No. 37/11). The National List of Indicators includes a set of indicators related to land, which support the systematisation of information on the condition of land, land use changes and factors regarding land degradation. Contaminated site management is regulated by the regulation on the establishment of criteria for assessing the status of the endangered environment and priorities for rehabilitation and remediation (OG of RS, No. 22/10).


Implementation & approximation of EU legislation

In response to concerns about the degradation of soils in the EU, the Commission published the Thematic Strategy for Soil Protection in 2006. The proposal for the Directive, which establishes the frameworks for
soil protection was published together with the Thematic Strategy but has never been adopted. On the contrary, Serbia adopted its own Law on Land Protection. Before the adoption of this law, soil protection was largely ensured through the Law on Agricultural Land and the Law on Environmental Protection. Many ordinances and regulations for land monitoring, adopted in the period 2009 - 2011 and according to the Law on Environmental Protection, are fully compliant with EU requirements.

A rulebook on the program of systematic monitoring of soil quality, indicators for risk assessment of the soil degradation and a methodology for development of remediation programs are provided as suggested by the European Commission in 2006 (COM (2006) 232). Soil contamination represents a recognized threat in Europe, but even so, it is difficult to quantify the real level of localised pollution, given that many European countries do not have comprehensive inventories of contaminated sites. The EU has no legal framework that obliges States to identify contaminated sites. Identification and monitoring of the contaminated sites in Serbia are harmonised with EU regulations: The European Pollutant Release and Transfer Register (E-PRTR) 166/2006 / EEC; Directive on Integrated Pollution Prevention and Control 19 96/61/EEC, 2008/1/EEC; Regulations of the European Agency for Environmental Protection (EEA) (Indicator CSI 015 - Progress in management of contaminated sites).

Monitoring the state of erosion and organic carbon in the soil is carried out in compliance with the Technical Guidelines for the Collection of Soil Erosion and Soil Organic Carbon Data for Europe through EIONET, 2010 (European Commission, Directorate General JRC).

B6.5 Overview of the Forestry/Water/Soil/Natural Resource Management Projects in the Country

Projects in the forestry, soil, and water sectors are mainly oriented towards improving the existing situation and the sustainable management of resources. Essentially, several main thematic areas that are in focus of the forestry sector are climate change effects, wood biomass with accompanying issues, innovative improvement of the system of forest management and preparation of the project funded by the GEF (f. e. the second National Forest Inventory – NFI). The project is planned for a period of four years (2017 - 21), with a total budget of 30 million USD (GEF contribution is 3.5 million USD).

One of the priority needs of multi-purpose forest resource management planning is a sound and reliable database, which is in need of improvement. The existing forest resource database is incomplete for state forests, and unreliable for privately owned forests. The system should not only accommodate forest resource data, but also all other data that would facilitate planning, and need to be multipurpose and multisector oriented. Second NFI will improve database from forests (state and private) and contribute to the comprehensiveness of collected field data.

The project “Introduction of Innovative Management Planning in Forestry, taking into account economic, environmental and social aspects in Serbia” is funded in the amount of 500,000 euros from the Government of the Federal Republic of Germany with the aims of applying “close to nature forestry” and the provision of a whole range of ecosystem services as one of the main aspects of the development of a new system of planning and monitoring of forests in Serbia. The overall objective is to prepare forestry of Serbia for the most widespread phenomenon of climate change and meeting the needs of society in relation to the forest.

One of the most important projects that significantly affected the water sector was the “Preparation of the Water Management Information System for the Republic of Serbia” (WMIS), supported by the EU (2007 - 2009). One of the main objectives of the project was to establish and modernise water sector collecting information and data management as well as procedures for late data usage. The beneficiaries of the project were the Ministry of Agriculture and Environmental Protection, National Water Directorate, and water management public companies. Also, an important part of this project was to identify components that support flood action plans and support to water inspection activities. The project also offered logistical guidelines for institutional strengthening and capacity building to the Water Directorate and other water...
resources management institutions.

During 2015 and 2016 the Government of Japan financed the project titled “Increased Resilience to Respond to Emergency Situations”. The main goal of the project is to support recovery, reduce vulnerability and increase resilience in 27 flood affected municipalities through area-based, multi-dimensional and integrated approaches. The expected outcomes from the project are: reparation and improvement of small-scale infrastructure elements (like checking dams), wastewater treatment and improving public utility infrastructures damaged during the floods. In this context, it is also very important to mention the reconstruction of flooded areas that have been realized mostly through the EU assistance. A project was funded from the instrument for pre-accession assistance (IPA) in 2012. These activities were originally implemented in 24 local self-governments most severely affected by floods. These funds were used for the reconstruction of private houses, rehabilitation of public institutions objects and roads.

Serbia does not have a project relating to the management of land resources. Some of the projects in the field of environmental protection and rural development, financed by the government and foundations are partly involved in the state of land resources in terms of its use. A land protection project is funded only by state institutions such as the Ministry of Agriculture and Environmental Protection, the Secretariat for the Environment Protection of the City of Belgrade, and some cities and municipalities. One of the most significant projects in the last five years, funded by the Ministry of Agriculture is the project “Establishing the Conditions, the Level of Soil Pollution and Chemical Degradation of Soil in the Industrial Zone of Pancevo and Sabac and at the Fire Site on the Mount Tara”, to the amount of 124,610.00 euros.

B6.6 Evaluation of the main trends and gaps for natural resource management

Forest site potential for wood and biomass production has been used less than 50% and regarding this, it is necessary to improve and harmonise management of forests towards biological laws of growth and sites productivity. The further trend of strong influences of climate changes and defining possible scenarios of the reaction of forests and forest ecosystems to these effects, pointed out the necessity for adaptabilities in forest resources management policy, regarding justifiable ecology and economic validation of forests.

Besides the unsatisfactory amount of wood production, other natural resource values of the forest could be better used. In that context, there is a need for improving knowledge of non-wood forest products utilization (like ecotourism) and collection, harvest and trade of medicinal herbs, berries, and mushrooms, etc.

Most of the institutional shortcomings in the forestry sector derive from the lack of implementation of an accepted forestry policy, a partly outmoded legislative framework and forest management plans. There is a visible imbalance regarding need, plans, the number of employees and the prescribed obligations for each forestry authority. All of them have an immediate need for the updating of information systems, coordination between each other and related institutions. Nevertheless, the need to emphasise significant efforts in the sector (Ministry and public enterprises), over the last several years in order to educate employees through cooperation with domestic and international science and research institutions has been done.

The low technical levels in all activities connected to forestry are evident, which have led to low productivity and high costs in forestry enterprises. The aforementioned is a consequence of, among other things, a lack of domestic capital, foreign investments, cooperation between enterprises, and low worker motivation. Insufficient developed infrastructure presents a barrier for intensive use of equipment, and also for a realisation of many other planned activities in practice. It should also be noted that the main user groups in the forestry and forest industries have changed their business philosophy and become more market oriented in the past 20 years. Unemployment and social instability have increased in rural areas and were influenced by factors outside of the forestry sector.
Besides the existing various data from private forests (from Forest Management Program²), there are no complete data available for private forests since the inventory of private forests (which started in 2012) was stopped after 2 years of collection. In general, the condition of private forests in Serbia is characterised by a very high percentage of coppice forests, scrub, and brushwood. Private forest holdings are small, and owners have little or no cooperation between each other. Good cooperation and partnership between private enterprises and private forest owners is the notable way to improve management of the private forests. It is also important to emphasise that government support policies are inadequate and management plans are seldom made. Support to the inspectors of the Ministry and “on the ground” control is provided by forest engineers from forestry public enterprises (PE). So, since private forests cover almost 50% of forest area, with the potential they have, it is evident that they should deserve at least equal emphasis in the same way that state forests already have.

The greatest threat to the maintenance of preservation forest areas is a lack of funding. The lack of additional education and in a part limited awareness of employees concerning of biodiversity are evident at all levels of organisations, both in state and in privately owned forests. There exists great potential to increase and protect biodiversity in private forests; nevertheless, it needs to point out that private owners are more interested in economic dimensions of business than in increasing and preservation of biodiversity in their own forests. On the other hand, in some areas (i.e. national parks) the pressure of increased tourism is threatening biodiversity and some other issues of the overall functionality of forests. Municipalities are contributing to this through liberal land-use planning, construction permits, etc. in order to increase economic activity in depressed rural communities.

Regarding the wood industry, it is important to highlight that this industry sector does not have any administrative representative in relevant Ministries, and besides, the sector contribution to the GDP is only about 3%. However, the wood-processing industry did make some cooperation contracts with foreign companies, focused on sawmill and biomass industry. Much of the existing industrial wood processing capacity is not currently being utilised. On the other hand, international cooperation in core forestry sectors exist, but at a lower level compared to the wood industry.

Sustainable development implies the preservation of water quality. In the past, there has not been sufficient attention paid to and investment in waste water treatment, which contributed to the deterioration of the quality of water courses or recipients. Water quality protection measures are seldom used. Perpetrators are difficult to identify and the fines are feebly low. Due to this attitude to water, most water courses over the summer months are in a state that is adequate only for irrigation purposes, and even this is not always the case. Over the most recent period, a series of measures have been undertaken and sanctions against polluters introduced.

Key problems related to water are: the national legislation is still not harmonised with the contemporary EU trends and standards; a lack of planning regarding the implementation of the EU Water Framework Directive; insufficient institutional and other capacities; inadequate funding of water management a low price for water and services and a lack of economic incentives; a lack of harmonisation in sectorial policies with other sectors; an insufficient percentage of connected households to public systems of water supply; a lack of rational use of water, and poor quality of water in certain areas; poor quality of water in certain water courses; and insufficient protection of water quality.

The organisational background of flood management in the Republic of Serbia is established and the structure complies with the requirements of the WFD and the FD. The functioning of the organisation is, however, problematic due to some overlapping in responsibilities concerning the Directorate for Water and the Sector for Emergency Management although two organisations cooperate adequately and they share data and information. The operation of the dams is under the responsibility of the several subsidiaries of the fully state owned EPS. Regardless of the problems, the organisational structure is solid, established its own culture and is capable of performing the everyday tasks of flood management.

Water Law regulates funding activities and investments in the sector of water resources management.

² Forest management plan for private forests.
Many experts believe that it is necessary to prepare a special Law on Financing of the Water Management because this area is inadequate and imprecisely covered by the Water Law. Over the past few decades, investments in flood protection have been insufficient (the construction of new facilities, and the maintenance of existing facilities) which was one of the main reasons for catastrophic flooding in 2014. Each new Water Law further reduced the importance of erosion and torrent control, and in the last Water Law (OG, 2010), the regulation of this issue was reduced to a few articles and the financing of works became the responsibility of local governments (municipalities). Reduced financing of works has resulted in the lack of maintenance of the facilities, as well as the lack of new facilities, which leads to a high risk of future flash floods. In addition to what has been mentioned, a significant problem is the ambiguous status of enterprises dealing with erosion and torrent control. The solution to this problem is the initiative of the state to participate more in the organisational and ownership structure of water resources management enterprises, in such a way that the existing water resources management enterprises become state-owned companies. Investment in this field must be much higher in the future. Otherwise, the costs resulting from damages caused by mismanagement will be several times higher. The applicable Water Law should undergo some changes, and the financing of erosion and torrent control works should involve certain institutions determined by some other laws (Forest and Land Directorates of the Ministry of Agriculture, Forestry and Water Resources Management, Department of Environmental Protection, Division for Emergency Situations of the Ministry of Internal Affairs, etc.).

Regarding the surface water quality in the territory of the Republic of Serbia as well as in the Danube basin, in the period of 2004 - 2013 water quality improves. The declining trend of water quality is registered in the Morava river basin, while water quality of River Sava has no significant changes, since the insignificant trend of SWQI indicators. According to the value of SWQI poor water quality is determined in the 7% of measuring locations (4 locations in the Autonomous Province of Vojvodina). The results of the SWQI analysis indicate that water quality at the measuring points of the Republic of Serbia slightly improves in the 2006 to 2013 period.

One of the drawbacks in the field of land resources is an absence a soil map of Serbia. Some parts of the map were done by the Institute of Soil Science of Serbia, but the official map, made 30 years ago, is still in use. According to the Law of the land from 2015, Serbia has the obligation to draw up a soil map, and a map of soil erosion. The last map of soil erosion of Serbia was produced in 1974 and since then only minor additions and revisions in terms of display have been added. Sadly, a new map of the whole territory of Serbia has not yet been prepared.

Serbia does not perform monitoring of organic matter content in the soil. There are data for certain parts of the territory of Serbia (Vojvodina and parts of Central Serbia), which are the results of the projects realised for certain periods of time (2002 - 2006, 2008). It is necessary to establish the procedures and methodology to create a list of indicators for continually monitoring the conditions of organic matter in the soil. The level of research of soil pollution caused by a localized source of pollution differs significantly from location to location. Variations occur as a result of different levels of government sites, but also due to incomplete reporting. In the next period, it is necessary to provide the basis for the systematic collection of data and information on contaminated sites through the Inventory of Contaminated Sites, which is an integral part of the information system of environmental protection.

**B6.7 Conclusions (status quo, trends and gaps regarding all three natural resources)**

Forestry in Serbia has the potential to make an important contribution to the country’s economic and social development. But, all of the potential (production of wood and biomass, non-wood products and other natural resource values of the forest) is used to a very minor and insignificant extent. The current forests’ state concerning the main structure and growing stock parameters is unsatisfactory which endangers the projection of future forestry development. Improved legislation, planning documents and institutional cooperation for implementation forest policy become a necessity. Therewith, properly structured, organized and equipped forestry institutions need to be capable to deal with the challenges that emerge in the
sector as the country makes sustained efforts to achieve its major foreign policy goal of accession to the European Union. Additionally, educated employees for specific specialisations are a necessity, which is constrained by, among other things, a lack of more programs within educational institutions themselves. The unbalanced approach to forest administration and management policy that places a higher emphasis on the state forest and forestland needs to be addressed and corrected. Such practices constrain future development of tasks regarding extension services, management plans, control and inspection, which requires properly identification and become a duty of independent stakeholders.

Unless owners organise themselves into voluntary organizations such as associations to defend their interests, improvements in the sector are unlikely to materialise. Besides the fact that forestry planning system has ecosystem approach, the level of biodiversity in forests could be more increased and protected, both in protected areas and in managed forests.

Despite recognition of the multiple dimensions of forest resources, forestry continues to be dominated by a narrow emphasis on timber production. Although this fact might not be considered as an issue, starting from the ideas that almost all forest functions are essentially dependent on the effects of assimilation – wood biomass increment, however this single focus comes in marked contrast to rapidly growing 'new' demands for environmental and biodiversity conservation, and other forest values from national and international communities, recognition of the need for greater sensitivity to the needs of poor rural population to supplement their incomes derived from forestry and related activities and commitments by the Government, through agreement and resolutions, to protect the global significance and values of forests.

According to the Thematic Strategy for Soil Protection EU, which has defined the notion of soil degradation as a loss of soil or loss of soil quality for a particular function, the main processes connected with soil loss and soil degradation in Serbia are as follows: degradation of the physical properties of soil, chemical (salinisation, acidification, nutrient depletion), biological degradation and soil loss (due to soil erosion and landslides). The soil classification is based on the genetic principles and corresponds to World Reference Base for Soil Resources (WRB) criteria but not officially implemented at a national level. Soil monitoring in Serbia is performed through a number of projects implemented by different scientific and professional institutions in different parts of the country, which has resulted in the existence of several databases. However, it is still impossible to present the entire territory of Serbia due to various harmonisation problems.

As part of performing soil characterization by monitoring soil production capability and soil contamination, it is necessary that a number of activities are carried out the aim of which is to achieve better and more orderly soil utilisation within the framework of sustainable development of agriculture and the ecosystem as a whole. It could be said that the goals of the sustainable development of soil utilization in Serbia are as follows:

- Prevention of any further soil loss and maintenance of soil quality during its use, especially in the fields of industry, mining, power production, etc.
- Rehabilitation of already degraded soils to such degree that they can be regarded at a minimum as environmentally ordered systems if not productively capable ones.

Although the Law on Agricultural Soils was adopted in 2006, legislation related to monitoring the quality and protecting the soil in Serbia is still underdeveloped. In line with this law a set of bylaws are currently being passed which define in more detail the program of continuous soil monitoring and data collection in a harmonised manner. A more thorough overview of the status, introducing systematic quality control and creating a centralised database at a national level is necessary for setting goals in the field of preserving the soil in Serbia. The Law on Soil Protection adopted in 2015 is largely committed to the establishment of soil quality monitoring across the entire territory of Serbia.

Management of natural resources has a direct impact on productivity and employment. Though human capital is enhanced, present organisational structures in the forestry sector are sometimes inefficient. Management, planning, and control of natural resources, although they have the characteristics of an integral, integrated and adaptive system, are still limited in a part.
B6.8 Recommendations for integrated management/intersectoral cooperation of the forest, water and soil resources in Serbia

Regarding cross-sectorial cooperation among forestry, water, soil and other sectors, it can be emphasised that:

- Efforts to change sectorial planning in Serbia; there is not enough horizontal corresponding between relevant ministries and sectors that are involved in spatial planning strategies.
- Further development and improvement of the planning and implementation of forest management plans, improving personal and technical capacities in the forestry sector, adequate forest roads infrastructure, effective forest protection, mobilisation of private forestry and developed a unique information system in forestry should be part of a stable sustainable forest management system, which will simultaneously promote and facilitate the management system in the sector of water and land protection as well as in many others.
- Improve existing methodology of collecting forestry data with specific emphasising nature protection and analytical prediction segment of occurrence of torrential floods.
- Standardization of forestry sectors data and public availability based on sectors requirements, with particular information on historical occurrences of natural accidents.
- Establish interactive GIS database of all sectors data, with specific, emphasise on torrential catchments in Serbia.
- Harmonisation of domestic and international methodology for assessing all types of degradation with specific points of vulnerability to erosion and flash floods.
- Creation of the interactive forests cadastre, together with cadastre of torrential catchments.
- Methodological revised method for creating and interactive map of forests, forest functions and soil erosion in Serbia.
- Enforce stronger administrative connections between relevant thematic sectors for strengthening administrative capacities on vertical and horizontal levels.
- Improve international cooperation in related sectors through capacity building process, but also in knowledge exchange and strengthening science policy interface in practice.
- Advance general cross-sectorial cooperation among forestry, water, and soil sectors, include all forest related sectors requirements in NFI process, but also in regular ‘forest stands inventory’ as permanent data base source.
- Development of cross-sectorial forest information systems with accurate data and on-line information exchange system.
- Promote awareness raising in presented thematic areas.

One of the national priorities for achieving sustainable development in Serbia refers to the protection and enhancement of the environment and rational use of natural resources. This implies integration and harmonisation of policy objectives and measures of all sectorial policies, harmonisation of the national legislation with that of the EU, and its full implementation. It is a priority to adopt and implement the draft National Environmental Strategy and the accompanying action plans, and to adopt and implement the National Strategy for Sustainable Use of Natural Resources and Goods (an inter-sectorial strategic document which is implemented through plans and programs and which is the basis for all individual resources and values, adopted by the Government of the Republic of Serbia). The adoption and implementation of the National Strategy for Sustainable use of Natural Resources and Goods will have an impact on reducing the pressures on natural resources. In order to integrate the environmental policies into other sectorial policies, especially in the sector of spatial and urban planning, it is necessary to build capacities to implement the strategic environmental assessment of policies, plans, and programs, according to the law. The adoption of the Strategy for Spatial Development of the Republic of Serbia is one of the priorities. There is the need to further strengthen the capacities of the Ministry of Environmental Protection, the Environmental Protection Agency, and the Environmental Protection Fund.
B6.9 Recommendations concerning follow-up activities for improved national resource management in Serbia

There is an overwhelming difference between what the Serbian forest resources are presently providing, and what they could potentially offer. In spite of this, however, forestry is not regarded as one of the priority sectors and is not receiving the adequate emphasis it deserves. In order to justify adequate emphasis and receive support, as well as to perform effectively in the course of development, it is essential that:

- The forestry administration and management should respond to the requirements of the emerging market economy and new demands on the forest resources, and make a structural adjustment accordingly. Institutions and organizations need to be adopted to respond multi-purpose forest resource management planning and implementation.
- Regarding the current forests state, it is necessary to increase total wood production level in accordance with the site potentials, as well as improve unfavourable structure by origin, structural form, irregular age class distribution and unfavourable assortment structure of wood volume.
- While foresters express justifiable concerns about the increasing pressure on forests due to an increased need for energy production, it is necessary to ‘open’ and significantly ‘develop’ other ‘resources options’, like melioration of coppice, afforestation and particularly, establishing the fast-growing energy plantations on less productive agricultural land, bareland and other low production lands.
- Forest information system should be developed “deeply” to ensure adequate database for sustainable management planning. Development of forestry information system will ensure better and regular data exchange inside of forestry sector, but also in forests related sectors.
- Improvement of forestry statistics and data quality through NFI process, but also on regular basis (annually) is required.
- Private forests need to be revitalized so as to prevent nearly half of the country’s forest resources to seat idle and be vulnerable to further deterioration. Forest administration and management policy should be adjusted to give equal emphasis to the private forests.
- Forest rural community involvement in forestry development activities need to be promoted to ensure additional income. So, rural forest communities should be organized and trained to take active role in privatizing forestry activities e.g. logging, NWFP.
- Adequate and competent analysis and restructuring of education programmes is required (professional, ecological, and political education programs).
- Improving the degree of harmony and interpenetration between forestry science and practice need to be done.
- Identification and conduction of based and applicative forest research projects are necessities of forestry and related sectors.
- It is also of importance to ensure that proclamations of protected areas on forestlands are in line with particular regions development and avoid depopulation of rural areas.
- Apply internationally adopted standards in forestry and related sectors, for better cross sectorial communications and market developing.

The implementation of the Floods Directive (FD) requires improvement in terms of legal and institutional frameworks through capacity building and preparatory activities. A capacity building program for the implementation of FD consists of activities such as further legislative developments and necessary linkages with the regulations of other fields, such as land use, further strengthening of the organizational background, central governmental bodies, hydro-meteorological services, river basin management authorities through targeted training. This program also requires advanced data collection and management, modelling and computing tools, local and territorial water and flood management bodies. Some activities are related to the planning and implementation of educational programs within the academia and on raising public awareness.

Preparatory activities include the development of detailed methodologies, capacity building for the
Implementation of FD also covers flood assessment and planning activities such as preliminary flood risk assessment (completed) and preparation of flood hazard and flood risk map (in progress, 27 of 99 APSFR (Areas of Potential Significant Flood Risk) as well as flood management plans (Initial stage of preparation of FRMPs (Flood Risk Management Plan) is in progress).

Soil management at the national, regional and global levels should be based on the principles of sustainability. The main goal is to raise awareness about the value of land as a resource that provides key services in the ecosystem, awareness of how the difference between the demand for land and resource availability increases, especially in the context of global challenges, as well as the importance of establishing a compromise between the multiple functions of land. Soil function can be preserved by systematic monitoring of the status and quality of the different categories of land including quantitative soil indicators.

In order to protect the soil from degradation, it is necessary that the organic matter in the soil preserve and maintain satisfactory. Since erosion is one of the most important factors of soil degradation in Serbia, it is necessary to establish a cross-sectorial cooperation in order to determine the real situation and to plan and implement measures of prevention and rehabilitation. It was confirmed that the level of research soil pollution, varies greatly from location to location, but variations occur as a result of different levels of management, but also due to incomplete reporting. For this reason, in the coming period, it is necessary to provide a basis for the systematic collection of data and information through the inventory of contaminated sites, which is an integral part of the information system of environmental protection.

With this in mind, it is necessary to:

- Promote sustainable management of land resources and improve land protection policy and sustainable productivity.
- Encourage investment, technical cooperation, policy, education, and awareness in the field of soil protection.
- Promote targeted research and development focused on identifying gaps, priorities and unify the economic/productive and social dimension and the environment in the area of land.
- Improve the quality and availability of data on land and information that are referred to users (collection, analysis, validation, reporting, monitoring, integration with other disciplines).
- Harmonise instructions and methods, measurement and indicators for soil protection and sustainable management.
Reference list of the data used for the assessment


Forest Resource Assessment 2015, Serbia (http://www.fao.org/countryprofiles/index/en/?iso 3=SRB),

Nature Protection Service data (http://zzps.rs)


Directorate of Forests data, (http://www.upravazasume.gov.rs)

PE Srbijasume data, (http://www.srbijasume.rs/planizv.html)

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ANNEX B6.1
Supporting datasets

Figure 6.3 Physical map of Serbia (modified Geographic map of Serbia, 1996)

Figure 6.4 The average annual values of air temperature (modified map from Water management strategy of the territory of the Republic of Serbia, 2015)

Figure 6.5 The average annual values of precipitation (modified map from Water management strategy of the territory of the Republic of Serbia, 2015)

Figure 6.6 Ownership structure in Serbian forest fund
Figure 6.7 Presence of certain tree species in Serbian forest fund

Figure 6.8 Spatial distribution of growing stock in Serbian forests (m³/ha)

Figure 6.9 Map of the Hydrographic Network (generated from Topographic Map of Serbia, 1973)

Figure 6.10 CORINE Land Cover (modified map from CORINE Land Cover (CLC), 2006)
Figure 6.11 Main watersheds in Serbia (modified map from Water management strategy of the territory of the Republic of Serbia, 2015)

Figure 6.12 Soil erosion map of Serbia (modified map from Soil erosion map of Serbia, 1983)

Figure 6.13 Technical and ecological works in the territory of Serbia (modified map from Water management strategy of the territory of the Republic of Serbia, 2015)

Figure 6.14 Trend and medium value of SWQI in rivers of the Republic of Serbia (2004-2013) (modified map from Report on the state of the environment in the republic of Serbia, 2015)
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Figure 6.15 Protected Natural Areas in Serbia (modified map from Publication about protected areas in Serbia)

Figure 6.16 Soil map of Serbia (modified map from Soil Atlas of Europe, 2005)

Figure 6.17 Spatial disposition of the most destructive torrential floods in Serbia from 1950 to 2010 (map generated for Ristić et al. Torrential floods and town and country planning in Serbia, 2012)

Figure 6.18 Map of organic carbon content in soil in Serbia (modified map from Report on the state of the environment in the republic of Serbia, 2015)