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Strengthening the value chain of energy biomass in the Drin River Basin for a more sustainable management of forests, and related Nexus implications

Phase II of the Water-Food-Energy-Ecosystems Nexus Assessment of the Drin Basin

In the framework of the project

"Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of the Nexus approach"

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Abbreviations

CORINE	Coordination of Information on the Environment (EU programme on land cover)
EEA	European Environment Agency
FAO	Food and Agricultural Organisation
GWP	Global Water Partnership
IEA	International Energy Agency
LULUCF	Land Use, Land Use Change and Forestry
MAFWM	Ministry of Agriculture Forestry and Water Management
MARD	Ministry of Agriculture and Rural Development
MED	Ministry of Economic Development
MTE	Ministry of Tourism and Environment
MTI	Ministry of Trade and Industry
RES	Renewable Energy Sources
SAP	Strategic Action Programme
SDG	Sustainable Development Goal
TBNA	Transboundary Basin Nexus Assessment
TDA	Transboundary Diagnostic Analysis
UNECE	United Nations Economic Commission for Europe

1. Background

The Nexus Assessment process in the Drin basin was initiated under the GEF-funded project "*Enabling Transboundary Cooperation and Integrated Water Resources Management in the extended Drin River Basin*" (the "Drin Project"), implemented by UNDP and managed by GWP-Med in cooperation with UNECE. The Transboundary Diagnostic Analysis (TDA) developed in its context included a "Thematic Report" on the Water-Food-Energy-Ecosystems Nexus, prepared in 2018-2019 with co-financing from the Austrian Development Agency (ADA).

Drawing directly from the conclusions of the Nexus Thematic Report, a quantitative "Phase II" Nexus Assessment in the Drin basin is being prepared in the context of the SEE Nexus Project ("*Promoting the Sustainable Management of Natural Resources in Southeastern Europe, through the use of Nexus approach*") funded by ADA and implemented by GWP-Med in partnership with the UNECE.

The present report is part of this "Phase II" Nexus Assessment in the Drin basin.

Report structure

A background of the Drin Basin and the forestry and biomass situation is presented in Chapter 1. Only a brief basin description is provided. The forestry and biomass description provides the current reference of the situation in the basin, and is elaborated in the remainder of the report.

Chapter 2 provides the methodology and approach used and is followed by the main chapter of the document in which the relation is indicated between biomass, forestry, energy and water. The main overall map of interlinkages is part of Chapter 3, while further detailed maps of interlinkages are used throughout the report to present and discuss sets of interlinkages around specific issues. Chapter 4 provides a reflection on sustainable resource use, especially forest management, while Chapter 5 elaborates on the energy biomass products. Chapter 6 presents the benefits related to sustainable biomass use and Chapter 7 gives the policy relations. The report concludes with recommendations towards forestry and biomass management and use for the Drin Basin and riparian countries.

Brief Basin description

The "extended" Drin River Basin is located in the region of the Western Balkans and it is shared by Albania, Montenegro, North Macedonia, Kosovo*[1], and – for a small share – Greece[2] (see Figure 1)[3]. The area of the basin is largely mountainous with peaks up to 2000-2500 m and a mean elevation of 971 m above sea level (UNECE, 2019).

[1] *United Nations administered territory under Security Council Resolution 1244 (1999).*
[2] *The analysis of the nexus focuses on the four main riparian (without Greece).*
[3] *For the Nexus assessment undertaken it was decided, since it is covers such a small area of the basin, not to include Greece*
** This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence*

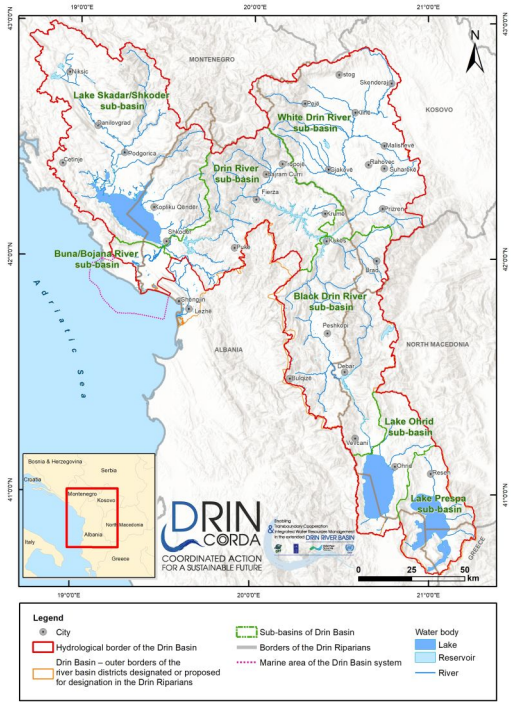


Figure 1 Extended Drin River Basin topography

The Drin River Basin includes seven sub-basins, each of them shared by at least two countries (see Figure 2). The total basin area is 20,311 km^2, with the largest share situated in Albania 38% (see Table 1) (UNECE, 2019*)*.

According to the European Environment Agency's CORINE programme, the land cover of the Drin River Basin is for the most part made of forests and scrubs /open spaces (33% and 36% respectively), and arable land covers about 20% of the basin area (see Table 2).

Sub-basin	Area (km^2)	% of Basin area
Lake Prespa	1,410	7%
Lake Ohrid	919	5%
Black Drin River	4,471	22%
White Drin River	4,292	21%
Drin River	4,237	21%
Lake Skadar/Shkoder	4,529	22%
Buna/Bojana River	453	2%
Drin Basin	**20,311**	**100%**

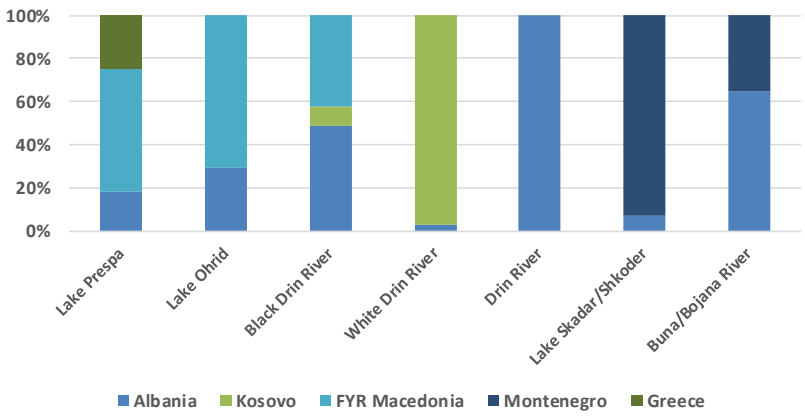


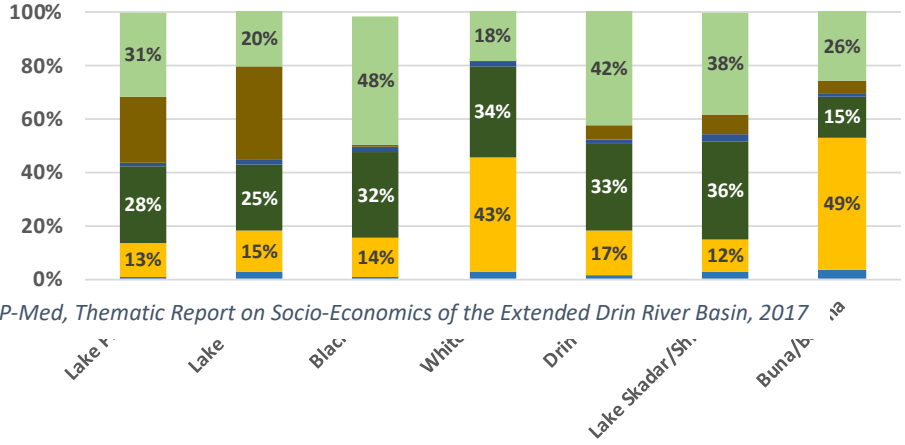
Figure 2 Area distribution by sub-basins (area of inland waters included) and shares of country portions for each basin

Table 1 Shares of land cover types (CORINE) by sub-basin (above) and by riparian (below)

Country	Total country area (km^2)	Area within the Drin Basin (km^2)	% of Basin area	% of total country area in the Basin	No of regions in the Basin	No. of municipalities in the Basin
Albania	28,748	7,724	38%	27%	6	16
Kosovo	10,908	4,567	22%	42%	5	14
Greece	131,957	347	2%	0.3%	1	1
North Macedonia	25,713	3,295	16%	13%	3	9
Montenegro	13,812	4,377	22%	32%	3	7
Total		**20,311**	**100%**		**18**	**47**

Source: *GWP-Med, Thematic Report on Socio-Economics of the Extended Drin River Basin, 2017*

Table 2 Territory, administrative regions and municipalities of Drin Basin riparian countries (area of inland waters included)



Source: GWP-Med, Thematic Report on Socio-Economics of the Extended Drin River Basin, 2017

Country	Urban fabric	Arable land*	Forests	Pastures	Inland waters***	Scrub and open spaces**
Albania	1.43%	17.19%	28.78%	1.50%	5.37%	45.59%
Kosovo	2.41%	41.71%	32.71%	1.54%	0.41%	21.39%
Greece	1.10%	9.83%	25.69%	0.40%	24.52%	38.47%
North Macedonia	1.09%	15.43%	38.07%	1.22%	14.93%	29.19%
Montenegro	2.68%	12.37%	36.72%	2.98%	7.86%	37.32%
Total	**1.86%**	**21.25%**	**32.83%**	**1.76%**	**6.67%**	**35.58%**
** Includes: Arable land; Heterogenous agricultural areas; Permanent crops*						
*** Includes: Scrub and/or herbaceous vegetation; Open spaces w/ little or no vegetation; Mine, dur*						
**** Includes natural Lakes Ohrid, Prespa and Skadar/Shkodra*						

Forest and Biomass situation in the Basin

As indicated in Table 2, forest and shrubs/open areas provide the vast majority of land cover in the basin, both counting for about 1/3 of the basin area, respectively about 667,000 ha forest and 723,000 ha shrubs and open spaces.

This data is based on CORINE Land Cover. The disadvantage of CORINE is that it is not always corresponding to the same classification as used by governments in the different countries. For example shrubs or waste lands are defined differently. When using the data for further analysis the CORINE also poses problems. In the analysis details of forests is made for degraded forest or for levels of illegal logging. Such details are not provided when using the CORINE data, hence these data will not correspond to the data of riparian. Use is therefore made of official data from the different countries for this report.

Unfortunately there is no data available at river basin level. Although sometimes regional data is available at country level, one cannot use this at river basin level, for basin levels geographical boundaries are used, instead of administrative units. To obtain figures at basin level the official riparian institutional data is used to calculate the relative share based on the relative area size of the basin at country level. This provides only a rough estimate as it does not account for regional differences, therefore rounded figures are used. This corresponds with data from the specific country institutions for the riparian and corresponding areas are provided. Although using the relative share for the basin provides a higher forest cover of the basin. This is mainly due to difference in defining shrub areas between the CORINE data and country statistics. For calculations, following estimates for relative forest area in the Drin Basin are used (see Annex 1, table 2), totalling 870,000 ha:

- Albania 280,000 ha;
- Kosovo* 200,000 ha;
- Montenegro 260,000 ha;
- North Macedonia 130,000 ha.

The forest areas in the countries are relatively stable[4]. See Figure 3 to for the trend over the past period of the forest areas in the countries of the basin.

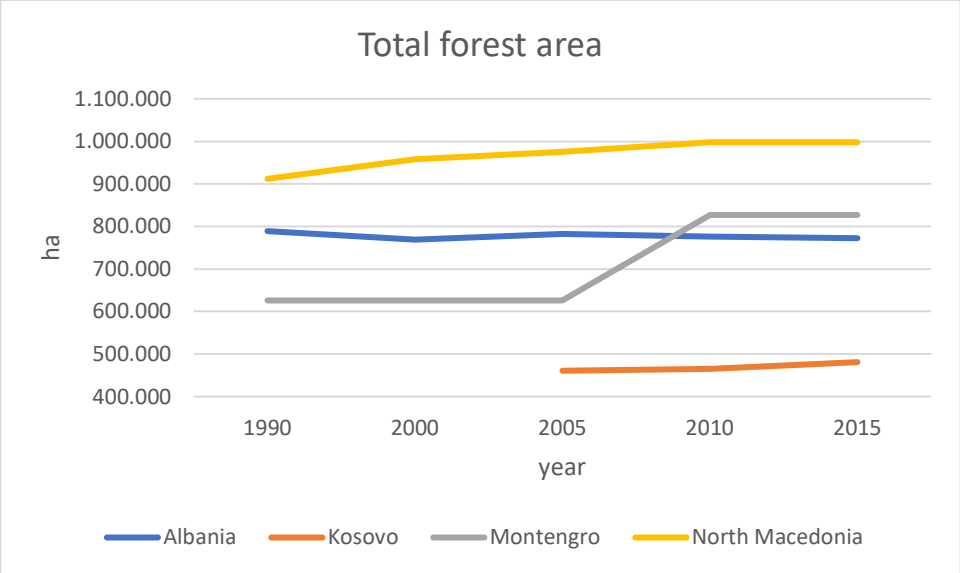


Figure 3 Forest area trend

[4] *The exception is Montenegro, but this is due to a different classification of forest areas.*

Source: references and detailed data are provided in Annex 1, Table 21

Besides the forest area there is a considerable area of trees and woodlots outside the forests. These are for example hedgerows, solitaire trees and small woodlots located in rural areas and along agriculture lands. The total area for the basin with trees outside forest is 550,000 ha (see Annex 1, Table 3).

These forest and forested areas provide an important source for wood products. The main categories are timber, construction wood, fuelwood and woody biomass (see Table 3). The most important product is fuelwood. Within the basin over 80% of all wood harvest is destined to fuelwood. Processed biomass for energy is only produced and used at limited scale and processed biomass is almost not produced in the Drin River Basin.

Table 3 Annual Harvest Wood Products

Annual Harvest Wood Products

Drin Basin	Annual harvest timber (m^3/yr) in Basin	Annual harvest timber (% of total)	Annual harvest fuelwood (m^3/yr) in Basin	Annual harvest fuelwood (% of total) in basin	Annual harvest processed biomass[5] (m^3/yr) in Basin	Annual harvest processed biomass (% of total)	Total annual harvest (m^3/yr) in Basin
Albania	20,000	2.5%	670,000	82.7%	120,000	14.8%	810,000
Kosovo*	90,000	7.1%	950,000	74.8%	230,000	18.1%	1,270,000
Montenegro	40,000	13.8%	250,000	86.2%	0	0.0%	290,000
North Macedonia	40,000	12.1%	290,000	87.9%	0	0.0%	330,000
Total	**190,000**	7.0%	**2,160,000**	80.0%	**350,000**	13.0%	**2,700,000**

Source: Annex 1, Table 4

Besides woody biomass also biomass from agriculture is obtained. However, only a very limited share of the agricultural biomass is used for energy production (see Table 4). Biomass from agriculture, so called agro residues, are remains from the main agriculture production.

Table 4 Biomass from agriculture

Biomass from agriculture

Drin Basin	Biomass from agriculture (tonnes/yr)	Share of total biomass from agriculture used for energy (%)	Biomass from agriculture used for energy (tonnes/yr)	Biomass from agriculture in Basin (tonnes/yr)
Albania	262,000	2.0%	5,240	70,000
Kosovo*	207,354	1.5%	3,100	90,000
Montenegro	8,154	0.0%	0	3,000
North Macedonia	72,636	4.0%	2,905	10,000
Total	**550,144**	**1.9%**	**11,245**	**173,000**

Source: Annex 1, Table 5
World Bank (2017) Biomass-Based Heating in the Western Balkans, A Roadmap for Sustainable Development

[5] *Processed biomass is defined here as woody biomass obtained for further processing, in general a chopped material for energy.*

The use of fuelwood and biomass for energy (see Table 5) in the basin corresponds with the production (Table 3). The majority of use is at household level for heating and cooking in traditional stoves. About 70% of all households in the riparian countries are using fuelwood as an energy source (see Annex 1, Table 7).

Table 5 Use of fuelwood or biomass for energy

Use of fuelwood or biomass for energy (m^3/yr)

Drin Basin	Use of fuelwood in the country (m^3/yr)	Use of fuelwood (m^3/yr) in the Basin	Use of processed biomass in the country (m^3/yr)	Use of processed biomass (m^3/yr) in the Basin
Albania	2,460,712	660,000	200,755	50,000
Kosovo*	2,265,000	950,000	329,550	140,000
Montenegro	753,853	240,000	426,617	140,000
North Macedonia	2,206,000	290,000	306,360	40,000
Total	**7,685,565**	**2,140,000**	**1,263,282**	**370,000**
Processed biomass is defined as the biomass excluding the fuelwood				
Source: Annex 1, Table 6 Albania: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO Kosovo*: MAFRD (2013) Kosovo* National Inventory 2012, Government of the Republic of Kosovo*, Pristina Montenegro: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO North Macedonia: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO				

Besides the important role of forests in the production of energy through fuelwood and biomass, forests are important in the provision of ecosystem services, like water provision and quality, climate change mitigation through accumulation of carbon in vegetation,[6] soil conservation, biodiversity and air quality. Further elaboration on the relation of sustainable resource use, the provision of ecosystem services and energy through biomass is provided in the next chapters.

[6] *See UNFCCC work on LULUCF, https://unfccc.int/topics/land-use/workstreams/land-use--land-use-change-and-forestry-lulucf*

2. Methodology

This study is part of the Transboundary Basin Nexus Assessment (TBNA) and a step in the participatory nexus assessment process. Current desk study provides an input for the analysis as described in the TBNA (Roidt, de Strasser, et al 2018, pg 15-17). This sectoral analysis for biomass and forestry is based on specific tasks provided for by UNECE.

The report is meant to map and quantify key intersectoral linkages, thereby informing the SAP in its implementation, shedding light on how action by the key economic sectors of energy and forestry can contribute to the objectives of the SAP (UNECE, 2019).

The Drin Basin is a transboundary basin and the issues related to water, energy and forestry are having its impact throughout the basin and require a transboundary approach. According to UNECE, 'Climate change, population growth, urbanisation and unsustainable economic development pose a major challenge for ensuring the availability of water. Given the complexity, scale of the challenges and most often transboundary aspects of water, strong cooperation is needed. Experience with transboundary water cooperation shows that it promotes increased energy and food production, enhanced resilience to disasters and economic integration' (UNECE, 2015-I).

The main focus of this analysis is on forests and biomass. A very simple and basic concept is used - what is the origin of the biomass, where does it come from? And secondly, a question is asked on which products are made of the biomass and how is it used? This is schematically presented in the figure below (see Figure 4 Basic concept).

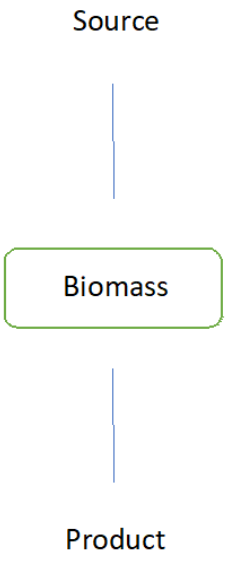


Figure 4 Basic concept

Biomass is here defined as biomass product; all biomass harvested for further use

Definitions

The word biomass is frequently used and in many different ways. The formal meaning of biomass is: *the mass of living organisms, including plants, animals, and microorganisms and it includes both the above- and belowground tissues of plants*[7]. This is a definition used in ecology and biology.

However, there is another use of the term biomass. Often biomass is used referring to it as a product. In this case the definition of biomass is: *plant or animal material used for energy production (electricity or heat), or in various industrial processes as raw substance for a range of products*[8]. This means all woody and non-woody biomass harvested, which includes fuelwood, as a product for any further use, especially energy. In general this meaning of the word biomass is used within this report. At times the term 'biomass product' is used, but in practice just the word biomass is used, as is the case in Figure 4 – where it clearly refers to biomass as a product.

There are also further usages of the term biomass, giving it a specific meaning and relevance. It is important to distinguish between these terms and to make clear what is meant when the term biomass is used. Other uses are:

Wood biomass, in the case of following the ecological definition would be all biomass, that has a wood structure. However when wood biomass is interpreted from the product side, it is becoming confusing. Is it including timber and construction wood, is it including fuelwood or only other biomass, such as chipped woody biomass? One way to define wood biomass is: *any timber-derived product (softwood or hardwood) capable of being converted to energy through direct combustion or gasification; to solid fuel through pelletizing; or to liquid fuel through myriad processes*[9]. This report is following this definition, although it is understood that there is also a very limited use of wood biomass for other purposes than energy, such as gardening or landscaping. Important to note is that this definition includes fuelwood and processed wood biomass. It may also include residues from the wood industry. In this report it includes in general fuelwood and processed biomass. When it includes others such as residues, this is made explicit.

Another common use is processed biomass to differentiate from fuelwood. In this case it only includes biomass that is obtained for further processing for energy use. It excludes fuelwood. In this case referring to a further developed and sophisticated biomass value chain then fuelwood.

It is clear that there are different usages of the term biomass. This can be confusing and leading to misunderstanding and interpretation, especially when talking about data. It is, however inevitable to make use of the different meanings of the term biomass. Care is take in this report to make sure that it is clear what is meant, either because of the context or through explicit mentioning.

Study set-up

To address the analysis for Biomass and Forestry, the analysis is aligned with the approach and goals of the TBNA. The overall aims are defined to '… provide a picture of various interdependencies across water, ecosystems, energy, food and other areas (e.g. climate change and biodiversity) in terms of uses, needs,

[7] *R.A. Houghton, (2008). "Encyclopaedia of Ecology"*
[8] *Ur-Rehman, S; Mushtaq, Z; Zahoor, T; Jamil, A; Murtaza, MA (2015). "Xylitol: a review on bioproduction, application, health benefits, and related safety issues". Critical Reviews in Food Science and Nutrition*
[9] *"What Is Wood Biomass?: RISI." Fast markets RISI, 3 Apr. 2017, www.risiinfo.com/industries/timber-bioenergy/bioenergy/what-is-wood-biomass/.*

economic and social benefits, potential synergies, conflicts and trade-offs. A further aim of the assessment was to identify possible policy responses' (UNECE, 2018).

Directly related to this are the final goals for this review as set by UNECE: 1) to make this theme relevant and understandable for the various sectors directly and indirectly impacted by the use of biomass (and potentially benefiting from changes towards sustainability); and 2) to make the case for stronger coordination on forest management at transboundary level / to point at the benefits of biomass development at regional level.

The following main steps are included to address the required tasks within the set goals:

- Collection of documents and data
- Mapping of interlinkages in close consultation with UNECE secretariat and Drin core group
- Review and analysis of data
- Prepare package of solutions and benefits
- Consultation

In the approach it was important to take stock of the previous phase and its findings. The final report of the first phase and especially the sections on forestry and biomass of the Drin Nexus Thematic Report are used as a basis. The list of **policies, institutions, and legislations** that are relevant to bioenergy and forestry in the Drin riparian countries are reviewed.

Relevant **statistics on forestry and biomass** for each country (and sub-national regions belonging to the Drin basin) were collected. The focus is on wood biomass; however, other fuel types such as agricultural residues are also considered. Next to statistical data, use is made of a FAO survey on biomass in the region and other relevant studies.

As explained, most data is obtained from direct sources, such as national institutions or international organisations. This has its limitations since these are generally only available at country level. Relative data for the Drin Basin area is therefore used as best option for the analysis. It is an expert estimate and provides an indicative value, it cannot be used as verified data.

A **map of interlinkages** (cross sectoral impacts, trade-offs, synergies) related to the use of biomass across the water-food energy-ecosystems nexus and associated interlinkages to quantifiable **key indicators** is elaborated based on the concept of biomass, its source and products (see Figure 3). Possible specific key indicators such as the amount of fuelwood used by each country, air pollution, share of degraded forest, efficiency of stoves, etc. are quantified when available. The complete sector and interrelationships is presented in an overall map of interlinkages produced. This overall map shows the complexity within the map of interlinkages, then more detailed maps illustrate more specific interlinkages and issues.

1. The maps are developed in close cooperation with UNECE (Secretariat and Core Group).
2. Linkages are made with key indicators to **policies/legislations** from the countries.
3. **Quantified key indicators for the case of the Drin**, at country or basin level, and basin (as appropriate, clearly explaining assumptions and methodologies used and indicating major data gaps).

Based on foregoing a review and further analysis of data is made, in which the following is provided:

1. A **package of solutions** using the 5 I's framework (Institutions, Information, Instruments, Infrastructure (and investments), International cooperation), specifying the means of implementation. The goal is to achieve sustainable production and consumption of biomass in the region, and to maximize the impact that a modern value chain of biomass would have on the economy within the basin.
2. Elaborated **benefits** associated with the package of solutions. Benefits are categorized in four groups: economic; environmental; social; and regional. Use will be made on policy guidance on benefits from Transboundary Water Cooperation (UNECE, 2015-II).

The following chapters provide the results of the desk study.

3. Water, Energy and Biomass relation

Water, energy and food are major areas of concern in sustainable basin management. In this chapter a specific review is made on the relation of biomass and forestry for water and energy.

Biomass concept and critical issues

The relationships of the biomass sector are manifold in relation to basin management. There are several critical issues that relate to either the origin of the biomass, from which source the biomass is obtained, as well as to products and its use of biomass. In Figure 5 Concept and critical issuesthe critical issues are listed that are identified in relation to the biomass value chain. In the first phase of the TBNA for the Drin Basin, biomass related issues were identified as well (see Annex 2). These are further elaborated in this study.

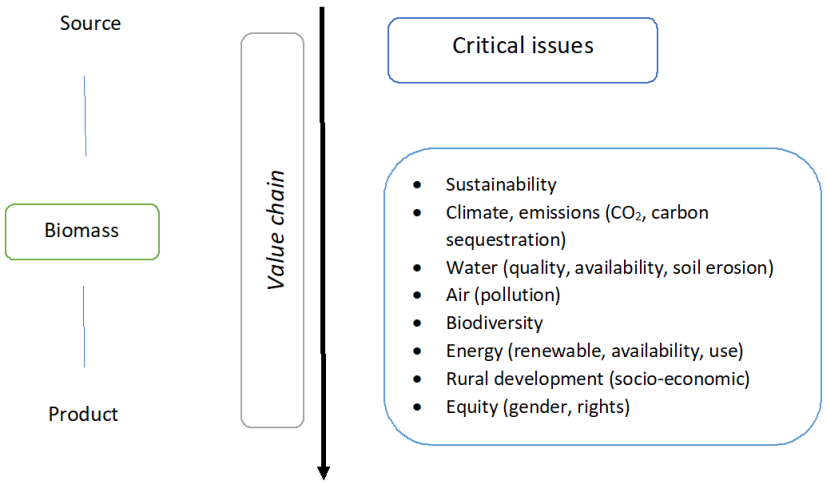


Figure 5 Concept and critical issues

These issues are related to certain Sustainable Development Goals (SDGs). Here only the relationship with the issues and the SDGs are indicated. Assessing the compliance at SDG target level is outside the scope of this study to further quantify the relationship. The relationship of the Drin Basin nexus is acknowledged in the first phase of the TBNA. According to UNECE, "Four SDGs are particularly relevant for the nexus under the Water Convention: the water and sanitation goal (SDG 6), which includes sustainable water management and improving transboundary cooperation beyond rivers; the goal to end hunger (SDG 2), which includes achieving food security and the promotion of sustainable agriculture; the goal to deliver affordable and clean energy (SDG 7), which includes providing access to sustainable energy for all; and the goal to preserve life on land (SDG 15), which includes the protection, restoration and sustainable management of ecosystems" (UNECE, 2018, pg 8-11). Also other SDG are connected with the biomass sector. Rural development is related to the socio-economic situation in the basin and impacts poverty. The ability of carbon absorption of forests influences climate change, connected with SDG 13. The table below shows the relation of the critical issues with the SDGs.

Table 6 Connection of SDG and Critical issue

SDG	Description	Critical issue of the biomass nexus
SDG 1	No poverty	Rural Development (socio-economic)
SDG 2	Zero hunger	Sustainability Biodiversity
SDG 5	Gender equality	Equality (gender, rights)
SDG 6	Clean water and sanitation	Water (quality, availability, soil erosion), flood protection
SDG 7	Affordable and clean energy	Energy (renewable, availability, use) Air pollution
SDG 13	Climate action	Climate, emissions (CO_2, carbon sequestration)
SDG 15	Life on land	Biodiversity Sustainability

These critical issues are placed within a map of interlinkages (Figure 6), showing the connections and interrelations of the issues with the biomass sector.

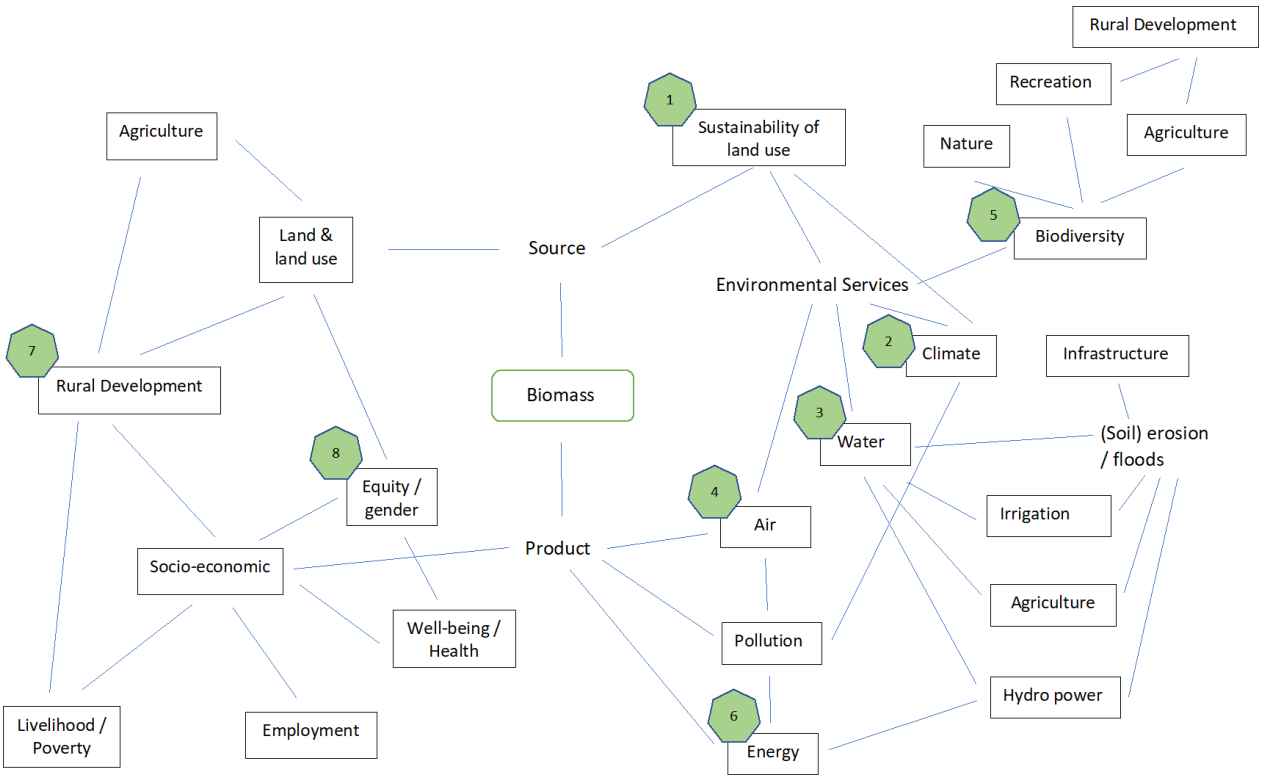


Figure 6 Map of Interlinkages

#	Issue
1	Sustainability
2	Climate, emissions (CO_2, carbon sequestration)
3	Water (quality, availability, soil erosion)
4	Air pollution
5	Biodiversity
6	Energy (renewable, availability, use)
7	Rural Development (socio-economic)
8	Equality (gender, rights)

Biomass is a natural product coming from natural resources. Natural resources are important for the provision of products and services. The management and use of natural resources influences the amount and quality of provision of these products and services. There is a direct connection between the land & land-use, harvest of biomass and the ability to provide other products and services, now and in the future. This aspect is crucial and relates to sustainability of the natural resources.

Sustainability and land use had a direct influence on the level of ecosystem services that are provided and the products that can be obtained. When a natural resource is unsustainably exploited for the production of biomass this has a negative impact on other production capacity, hence influencing SDG 2 on food production through the issues sustainability and biodiversity. It also influences the provision of environmental services which directly relates to a range of critical issues and related SDG.

On the other hand, the biomass products used for energy have an influence on the energy type, availability and costs, directly related to SDG 7. Biomass as a renewable energy resource may have a positive impact if sustainably harvested, influencing the ecosystem services positively (less fossil fuels are needed). Improved biomass products can have a higher efficiency in energy production, especially compared to use of traditional firewood logs, hence resulting in a positive impact.

Sustainable land use and a further developed biomass value chain has a positive relation to rural development. If sustainably implemented it contributes to income and job opportunities and a better living environment for people in rural areas. However, since biomass is obtained from natural resources, who benefits mainly from it also relates to who controls and has rights of these resources (SDG 1 and 5). Control, ownership and power relations are not always equally distributed which may lead to certain groups benefits less and widening the rich-poor gap.

In the following of the report specific issues related to the map of interlinkages (see Figure 6) are further elaborated. The issues especially relevant to the Drin Nexus Assessment are elaborated; water, energy, forestry and climate. The others issues are dealt with within these main issues.

The Land – Energy – Water - Climate relation

From the general map of interlinkages a concentrated view is made on the key issues related to biomass; land, energy, water and climate. This is schematically reflected in the land – energy – water – climate map (see Figure 7).

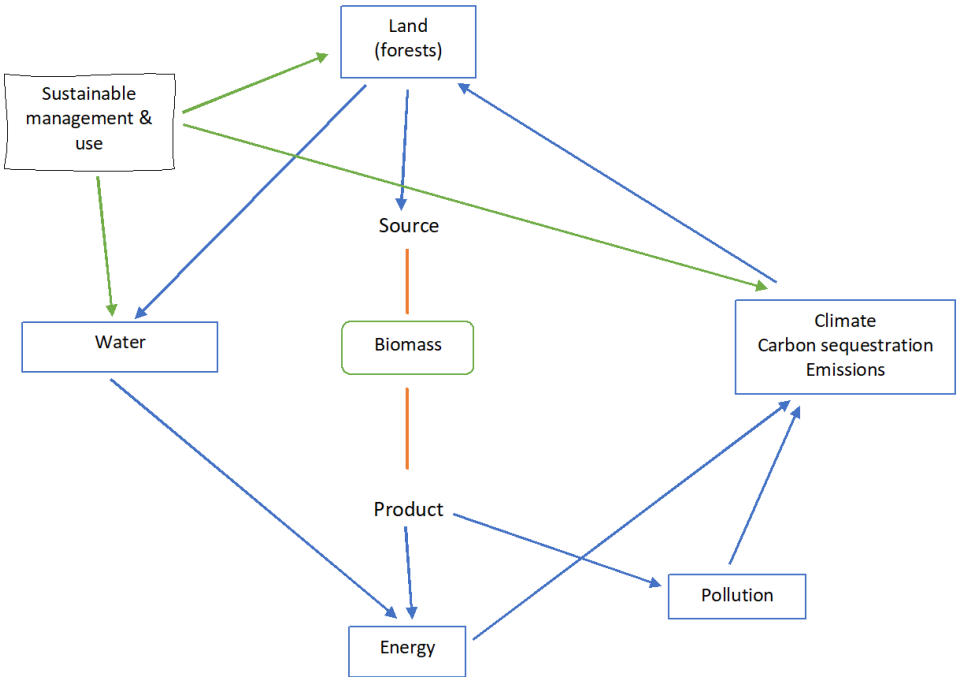


Figure 7 Land - energy - water - climate relation

The blue lines present relationships to directs sources or products, the green lines present relate to an approach, in this case sustainable management & use.

The land and especially forest lands are the main source of biomass, but are also major contributors to the ecosystem services; the provision of water and carbon storage.

Forest and land

All biomass in the basin is originally coming from a land resource. To understand the biomass sector and further develop its value chain it is crucial to know how much land is available and what is the growing capacity. In the Drin Basin 21% of the land is arable land, 33% is forests and 36% are shrublands (see Table 2). The most important source for biomass are forests, having **870,000 ha** within the basin (see Error! Reference source not found.).

From the forests in the Drin River Basin annually **2.7 million m^3/year wood biomass** is harvested of which 80% is fuelwood and 12% processed biomass (see Table 3). Additionally about **0.17 million tonnes/year biomass** is harvested from agricultural land (see Table 4).

It is important to review if this harvest is sustainable. The total stock[10] of wood in the forests in the basin is 82 million m^3 with an annual growth of 2.1 million m^3/year (see Annex 1 Tables 8 and 9). There are also trees and woodlots outside forests contributing to biomass. These comprise of an area of 490,000 ha with an annual growth of about 0.1 million m^3/year (see Annex 1, table 10 and 11). This gives a **total annual wood biomass growth of 2.2 million m^3/year** within the Drin Basin.

Based on these figures there is a negative balance of 0.5 million m^3/year wood biomass harvest. This would mean that there is overexploitation of the resource. However, this figure needs to be taken with some consideration, the figures of annual growth are based on wood stem up to 7 cm diameter, not taking into account branches and smaller dimensions, while these are used often as fuelwood and for processed biomass. On the other hand, illegal logging is not taken in to account and there is also a loss of wood biomass due to forest fires and diseases.

Taking this into account there is concern of unsustainable harvest leading to a diminishing ability of forest and land resources to provide ecosystem services, including the sustained provision of biomass and other forest products itself in the long term. The area of 12% degraded forest (see Table 7 and Figure 8) in the Drin Basin is an indication of unsustainable management of forests.

Table 7 Degraded forest area

Degraded forest area

Drin Basin	Relative Forest area in the Basin (ha)	Degraded forest in Basin (ha)	Share of degraded forest in Basin (%)
Albania	280,000	60,000	21%
Kosovo*	200,000	20,000	12%
Montenegro	260,000	10,000	4%
North Macedonia	130,000	6,000	4%
Total	**870,000**	**96,000**	**11%**

Source: Annex 1, Table 12
Albania: INSTAT (2019) Statistical Yearbook 2019, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/en/themes/agriculture-and-fishery/forests/publication/2020/forest-statistics-2019/
Kosovo*: MAFRD (2013) Kosovo* National Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro: FAO (2020) Country Report Montenegro, Global Forest Resources Assessment 2020, Rome, http://www.fao.org/3/cb0029en/cb0029en.pdf
North Macedonia: State Statistical Office (2020) Forestry 2020, agriculture statistics review, Government of the Republic of North Macedonia, https://www.stat.gov.mk/PrikaziPoslednaPublikacija_en.aspx?id=34

The areas of degraded forest are stable over the past decade (see Figure 9). Only Montenegro is showing an increased area of degraded forest land.

[10] *Total stock is defined as standing volume wood biomass in forests of stem volume up to 7cm diameter*

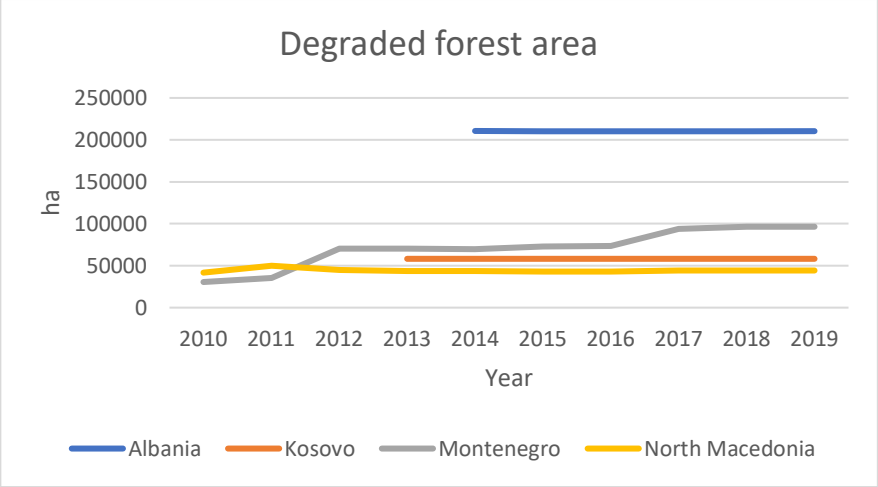


Figure 9 Degraded forest area trend

Source: Detailed data and references are provided in Annex 1, Table 20

Based on the current data and situation analysis it is at least clear that the harvest is either just on the edge of a sustainable balance, but more likely unsustainable. In order to further invest and develop the biomass sector it is crucial to keep in to account the sustainable management of the source of biomass. Key indicators (see Table 8) provide an indication of the balance between growing capacity and harvest. For sustainable management a harvest up to 80% can be made, however to account for losses due to wildfire, diseases and windfall a fellings-to-annual-increment ratio of approximately 70% is recommended to ensure the sustainable management of forests (EEA, 2017). Taking these sustainable forest management standards in to account the allow annual harvest would be about 1.7 million m^3/year.

Table 8 Forest and Land key indicators

Key indicators Forests and Land in the Drin Basin		
Key indicator	*Value*	*Reference*
Forests land (ha)	870,000 ha	**Error! Reference source not found.**
Wood biomass harvest (m^3/yr)	2,7 million m^3/yr	Table 3
Annual growth forest (m^3/yr)	2,2 million m^3/yr	Annex 1, table 9, 11
Degraded forest (ha)	96,000 ha	Table 7

Source: see different tables referred to in the table above

The need for sustainable management of the forest land resources is not only a local issue, especially because of the connection of harvest and the provision of ecosystem services that are going beyond borders. This is especially the case for water provision, flood and sediment control, climate mitigation and biodiversity. These ecosystem services are not limited to its locality, but have an impact within the basin. The use and management of forest and natural resources have an impact on the extend such ecosystem services are provided throughout the basin. For example forest management has a positive or negative influence on soil conservation, which influences run-off levels, hence occurrence of flood in the river basin. Sustainable forest management has a positive impact soil and water conservation and can reduce flood risks and amounts of sedimentation. Understanding these relationships is crucial for an overall sustainable transboundary river basin management.

Energy

The biomass obtained in the Drin Basin is mainly used for energy. Of the total harvest of 2.7 million m^3/year in the basin 80% is used as fuelwood and an additional 13% is processed biomass (see Table 3). The harvest of biomass corresponds with the use of biomass in the basin. Also, the fuelwood harvest of 2.16 million m^3/year compares with a 2.14 million m^3/year use of fuelwood in the basin (see Table 5).

The vast majority of all fuelwood is produced for the internal markets. Only very limited amounts of fuelwood are exported (about 1% of the total annual fuelwood harvest) as indicated in Table 18 of Annex 1. The share exported processed biomass is larger, but processed biomass constitutes only a limited part of the total annual harvest (see Table 3 Annual Harvest Wood Products). Export is currently not a driver for forest exploitation. However, it is estimated that the demand for processed biomass for energy production will further increase in the future, internally and within the European Union. This demand may lead to an increased demand for wood harvest.Table 3 Annual Harvest Wood Products

Table 9 Type of energy use

Drin Basin	Energy use per country (GWh/yr)	Energy use fossil fuel per country (GWh/yr)	Share of energy use of fossil fuel (%)	Energy use renewables per country (GWh/yr)	Share of energy use of renewables (%)	Biomass use of renewables per country (GWh/yr)	Share of energy use of biomass (%)	Share of biomass use of renewables (%)
Albania	28,994	15,309	52.8%	13,685	47.2%	7,582	26.2%	55.4%
Kosovo*	19,514	13,786	70.7%	5,728	29.4%	5,663	29.0%	98.9%
Montenegro	8,897	5,508	61.9%	3,389	38.1%	1,750	19.7%	51.6%
North Macedonia	25,668	19,382	75.5%	6,286	24.5%	5,832	22.7%	92,7%
Total	**83,073**	**53,985**	**65.0%**	**29,088**	**35.0%**	**20,827**	**25.1%**	**71.6%**

Source: see Annex 1, Table 13
All countries: IEA (2020) Data & Statistics, https://www.iea.org/data-and-statistics?country=WORLD&fuel=Energy%20supply&indicator=TPESbySource, visited 2020-10-23
Additional reference for biomass use related data: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12

Biomass is the most important energy source for renewable energy in the region, 72% of all renewables is from biomass, while renewable energy makes about ¼ of all energy used (see Table 9). The renewable energy includes biomass, hydropower, solar and wind energy. In Albania and Montenegro the share of hydropower of the total energy consumption is relatively large, hence making the share of biomass a bit less of the total renewable energy compared to Kosovo* and North Macedonia. Data used here is referring to the total energy consumption in the countries, if only electricity would be considered the share of hydropower would be much higher. Biomass (fuelwood) is especially used for space heating making biomass so important for fulfilling the energy demand in the riparian.

The data used is based on official country data as provided to the IEA (International Energy Agency), but additionally, biomass related data from the FAO WISDOM project database has been used (FAO, 2020). The data of biomass use and consumption is underestimated in official data, therefore the FAO has undertaken

a specific study to reveal the actual biomass consumption in the region. The country data is adjusted making use of this study.

Overall, the Drin riparian produce less energy than they need, and the gap is filled with imports. There is an increasing effort in the region and EU to increase the share of renewable energy (UNECE, 2019). This drives an increasing demand on biomass for energy and as is clear biomass is already a crucial part of renewable energy. This demand, however is at odds with sustainable harvest of biomass production. On the other hand, an increased use of renewable energy is crucial to replace fossil fuels and contribute to climate change mitigation plans.

Table 10 Key energy indicators

Key indicators Energy total of Albania, Kosovo*, Montenegro and North Macedonia		
Key indicator	*Value*	*Reference*
Use of biomass for energy (m^3/yr)	9 million (7.7 million fuelwood, 1,3 million processed biomass)	Table 5
Share of energy use of renewables (%)	35.0%	Table 9
Share of biomass of renewable energy (%)	71.6%	Table 9

Finding the balance between energy use and production (Table 10) with sustainable management of the land resources is crucial.

Water resources

The availability of water, its quality and water management are one of the major ecosystem services within the basin. The water relations are directly depending on the management of natural resources and the use of the resources for products, like biomass. All riparian are depending on each other to effectively address the safeguarding of the water management. The relationship of land use and water is shown in Figure 10.

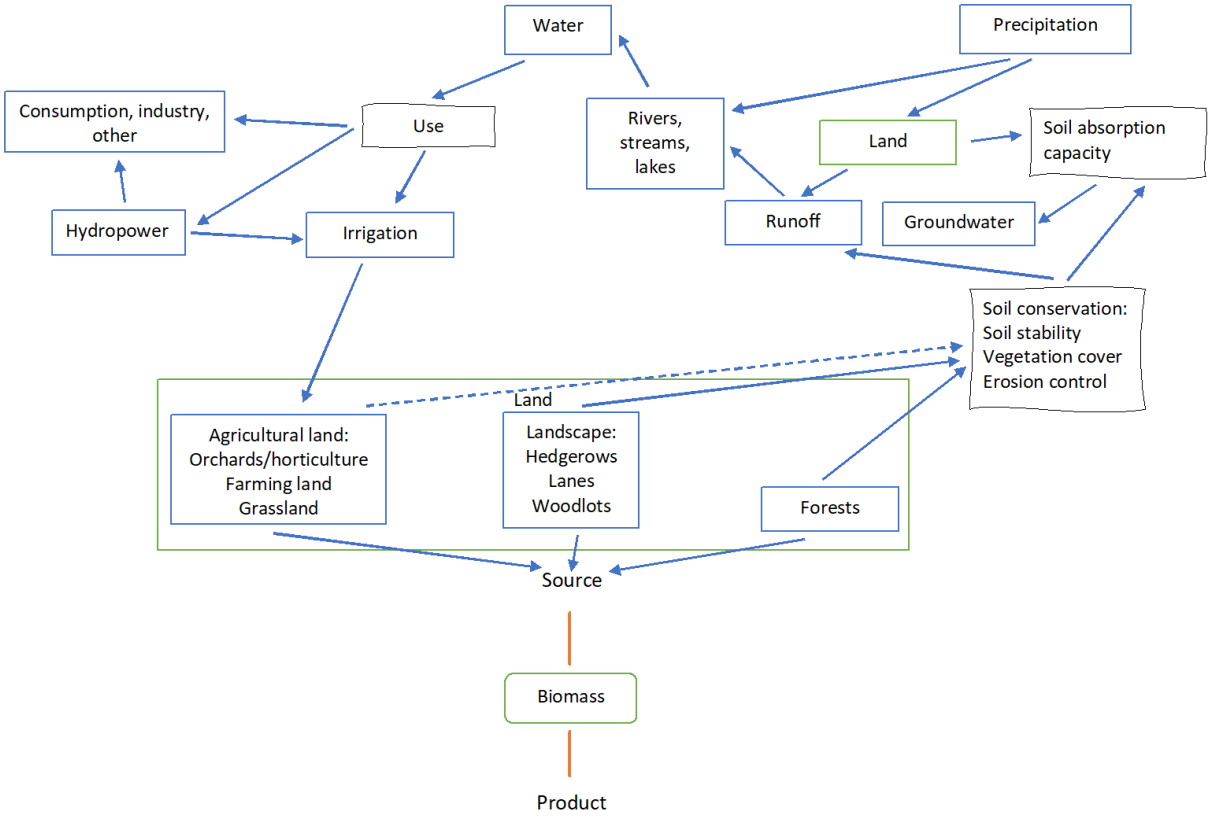


Figure 10 Water resources and land use relation

Soil degradation and erosion is a common problem in the region. The mountainous circumstances and steep slopes within the Drin Basin with high precipitation patterns makes the basin very sensitive for erosion. In North Macedonia yearly soil losses – at country level - are 17.1 million m^3, and over 2 million m^3 in Montenegro. In Albania, the yearly rate of soil loss is estimated at 10.9-15.1 t/ha (Binaj Agim, et. al, 2014).

Sustainable land use and sustainable natural resource management is required to assure that a proper vegetation cover exists to control erosion and assure soil conservation. Different studies are available providing recommendations and insights on the extend of soil erosion, water run-off and sedimentation In relation to vegetation cover. Sustainable managed forest provide the best soil protection cover on slopes.

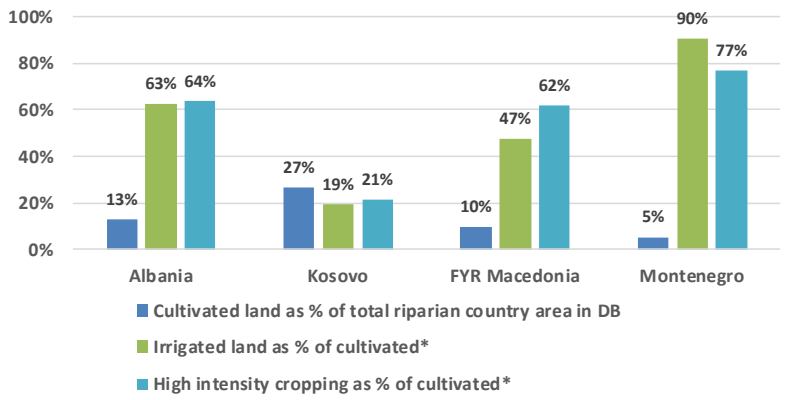


*Figure 11 Cultivated land ratios (*excluding meadows)*

Source: *GWP-Med, Thematic Report on Socio-Economics of the Extended Drin River Basin, 2017*

Different practices are provided from river bank plantations, sustainable forest management practices and erosion control measures to improve soil stability and reduce soil run-off (Blinkov and Kampen, 2014). Such practice reduces soil loss, but will also increase the soil absorption capacity, hence increasing the water availability and constant supply of water and reducing water run-off (see Figure 10).

Irrigated land is very important in agriculture in the riparian countries (see Figure 11). Overexploitation of forests leading to land degradation has a direct negative impact on irrigation, hydropower and other water uses. Erosion and floods leads to damages of infrastructure, like irrigation systems, and increases sediment loads in hydropower reservoirs, complicating operations, increasing costs and reducing lifespan of infrastructure, such as hydropower dams. It also leads to insecure water availability (peak run-off, reduced infiltration and sustained water provision).

Table 11 Water key indicators

Key indicators Water for the Drin Basin		
Key indicator	*Value*	*Reference*
Soil loss (m^3 or t/ha)	17.1 million m^3 in North Macedonia 2 million m^3 in Montenegro 10.9 – 15.1 t/ha in Albania	UNECE, 2019 Binaj Agim, et. al, 2014
Water availability from rivers or for irrigation (m^3)	Not available	
Vegetation cover (ha and %)	870,000 ha forest in the basin (33%)	**Error! Reference source not found.** and Table 1

Water use is a key issue for the Drin Basin. It is very complex and is related to all sectors, but it is also highly affected by these sectors. Sustainable management of natural resources and land is required. Key indicators can assist in achieving a sustainable management and use of natural resources (see Table 11). As explained, it is important to obtain sufficient water available and of quality in the basin for hydropower, irrigation and consumption in the medium/long term.

Climate

Climate change mitigation requires a balanced approach in the use of biomass for energy. There is a direct relationship of biomass and climate change mitigation (see Figure 7). From the perspective of CO_2 balance, the use of biomass for energy helps reducing emissions by replacing the use of fossil fuels and increasing the share of renewable energy. However, the harvest of biomass is also reducing the amount of carbon sequestrated in the wood and comes with a net release of CO_2 through emissions when it is converted in energy through the process of burning.

Table 12 Growing stock

Growing stock

Drin Basin	Relative Forest area in the Basin (ha)	Growing stock (standing volume m^3)	Growing stock (standing volume m^3) in Basin
Albania	280,000	54,925,000	15,000,000
Kosovo*	200,000	40,508,000	17,000,000
Montenegro	260,000	122,000,000	39,000,000
North Macedonia	130,000	87,779,890	11,000,000
Total	**870,000**	**305,212,890**	**82,000,000**

Source: see Annex 1, Table 14
Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*: MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro: Dees, Mathias et. Al (2013) National Forest Inventory of Montenegro, Ministry of Agriculture, Forestry and Rural Development, WISDOM FAO
North Macedonia: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12

The dilemma of increased use of biomass is an increased demand for biomass harvest in forests which may lead to uncontrolled and unsustainable harvest. If this is done unsustainably it will reduce the amount of carbon stored (see Table 12) and reduce the capacity of forests to carbon sequestration (CO_2 storage) due to forest degradation (see Table 13).

It is important to note that wood biomass used for energy is directly releasing the carbon through emissions, while wood used for lasting purposes (building and construction) is storing carbon during the lifespan of the product. From a climate change perspective, the preference is therefore using wood products in a sustainable use (meaning products having a long-lasting life), above use wood biomass for products with a short lifespan, such as biomass for paper or energy. The carbon stored in the wood products is released immediately when it is used for energy production.

Furthermore, using wood biomass for sustainable products has in general also an economic advantage since wood biomass products for energy have a low economic value compared to timber. The current share of wood biomass for energy (fuel wood and processed biomass) is very high in the riparian countries, up to 93% of the total annual harvest (see Table 3 Annual Harvest Wood Products). This indicates that most of the wood harvested is directly releasing the stored carbon by its use for energy, hence could be considered as contributing to climate change.

Table 13 Climate key indicators

Key indicators Climate		
Key indicator	*Value*	*Reference*
Growing wood stock (m^3)	82 million m^3	Table 12
Share of wood biomass for energy of total annual biomass harvest (%)	93%	Table 3

Consideration needs to be taken when at large scale production and use of biomass for energy is promoted. It takes decades to store the carbon in biomass, while it is released through biomass energy

directly. A growing debate is taking place in the EU about the extend and conditions regarding use of biomass for energy. If biomass can be regarded as a carbon neutral renewable resource depends on sustainability criteria, harvest and removals, land use changes and additional emissions along the value chain (e.g. transport) (Cătuţi, et al 2020).

4. Sustainable forest management in the Drin River Basin

Forests providing products and services are an important natural resource in Drin Basin as is described earlier in this report. On the other hand, the forestry sector in the Balkan and in the Drin Basin is, compared to the rest of the pan-European region, an under-developed sector contributing with a limited share to the economy of the riparian countries (Strasser and Stec, 2017).

Table 14 Sector contribution to GDP

Drin Basin	Contribution to GDP of forestry sector (mln €)	Share of forestry to GDP (%)	Contribution to GDP of agriculture sector (mln €)	Share of agriculture to GDP (%)
Albania	€ 31.1	0.3%	€ 21.4	19.6%
Kosovo*	€ 24.0	0.4%	€ 70.6	10.5%
Montenegro	€ 6.3	0.1%	€ 307.6	6.6%
North Macedonia	€ 30.0	0.3%	€ 855.5	8.7%
Total	**91.4**	**0.3%**	**€ 1,255.2**	**11.4%**

Source: see Annex 1, Table 15
Albania: http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf and http://www.fao.org/forestry/country/57033/en/alb/, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*: http://seerural.org/wp-content/uploads/2017/03/Annex-8-Kosovo*-trends-and-gaps.pdf, https://ask.rks-gov.net/media/4087/statisti%C4%8Dki-godi%C5%A1njak-republike-kosova-2017.pdf
Montenegro: MONSTAT: https://www.monstat.org/cg/page.php?id=19&pageid=19 and Forest Directorate, MONSTAT: https://www.monstat.org/cg/page.php?id=19&pageid=19
North Macedonia: Estimation based on WISDOM Macedonia and Statistical office: GROSS DOMESTIC PRODUCT publication, Statistical office: GROSS DOMESTIC PRODUCT, 2016 and WISDOM Macedonia

The actual contribution of the forestry sector is very limited, only 0.3% of the GDP, compared to 11.4% of agriculture (see Table 14). On the other hand the forestry sector encompasses a lot of informal activities that are not included, such as private use of forest products. People in rural areas make a lot of use of forest products for their own use and consumption, this includes firewood, but also non-wood forest products such as berries, mushrooms, nuts and herbs. Also, the value of services derived from forests are not accounted for. Important ecosystem services from forest are tourism, recreation, biodiversity, water source, climate mitigation, biodiversity etc. Especially such ecosystem services if quantified would show a large economic contribution. Some small attempts are made through university research, but until now quantifiable data for this are not available for the Balkans.

Wood products are therefore still seen as one of the most important ecosystem services in the basin, based on an assessment score of ecosystem services that support key economic activities in the basin (GWP-Med, 2017-I). The overview presented in Figure 12 indicates that this wood product service is in need for active management or even endangered and/or hampering other ecosystem services. This is corresponding with the analysis provided on 'forests and land' in the previous chapter. There it is argued that biomass harvest is overexploiting the capacity of forests and often unsustainable.

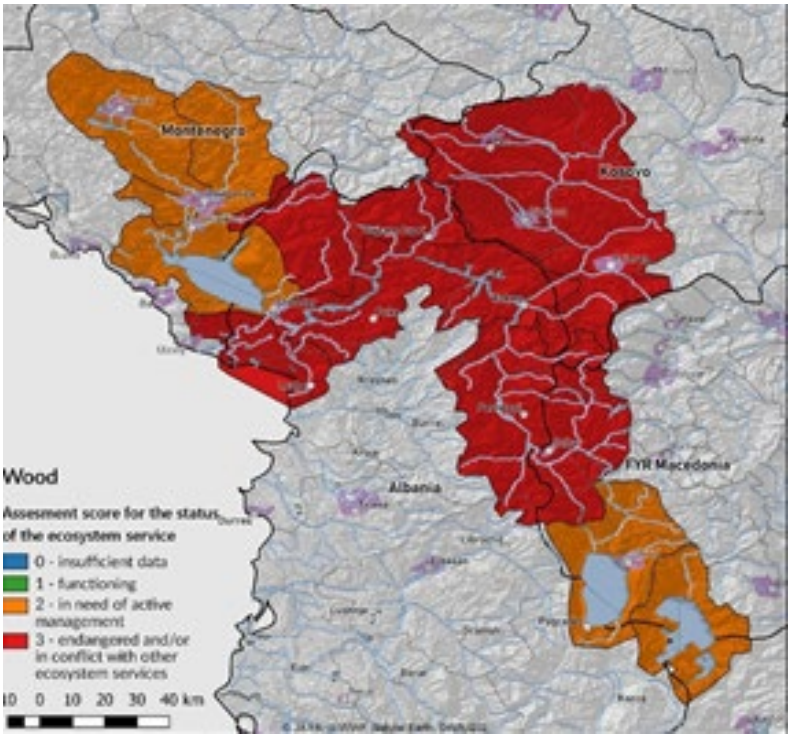


Figure 12 Wood ecosystem service

Source: GWP-Med, (2017-I)

In the Drin basin there are two general types of forests, “high forests” and “low forests”. The high forest are regarded the mature forests, often with a good timber production quality situated at higher altitudes. This forest are mainly comprised of Beech, Fir and Spruce. The low forests are in general coppice forests situated at lower altitudes traditionally used for fuelwood production (Oak and Hornbeam). The later have a variety of quality from very low to highly productive. Some of them include also nut trees, such as Chestnut, Hazelnut or Walnut trees timber and fuelwood extraction, Timber production takes place especially at the higher altitudes in the northern and central areas, while fuel wood production takes place throughout the basin, except for the coastal area. Productivity in these so-called maquis[11] forests is very low (FAO, 2020). The most common forest type in the basin are broadleaf forests, which are forests that produce mainly fuelwood in the basin (see Table 15).

Table 15 Forest types

Drin Basin	Relative Forest area in the Basin (ha)	Broadleaf in Basin (ha)	Coniferous in Basin (ha)	Mixed in Basin (ha)	Other in Basin (ha)
Albania	280,000	140,000	40,000	100,000	0
Kosovo*	200,000	190,000	10,000	3,000	0
Montenegro	260,000	200,000	60,000	50,000	0
North Macedonia	130,000	80,000	10,000	40,000	6,000
Total	**870,000**	**610,000**	**120,000**	**193,000**	**6,000**

Source: see Annex 1, Table 16
Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*: MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina

[11] *Shrubland forests in the Mediterranean region, typically consisting of densely growing evergreen shrubs.*

Montenegro: Dees, Mathias et. Al (2013) National Forest Inventory of Montenegro, Ministry of Agriculture, Forestry and Rural Development, WISDOM FAO
North Macedonia: State Statistical Office (2015) Forestry 2014, agriculture statistics review, Government of the Republic of North Macedonia, http://www.stat.gov.mk

The relation between forest and biomass taken from the key interlinkages map (see Figure 6) is provided in detail in the figure below (see Figure 13). Sustainable management of forests and the competition between provision of products and safeguarding other ecosystem services is a critical issue, while also competition between different wood biomass products and ownership rights are critical.

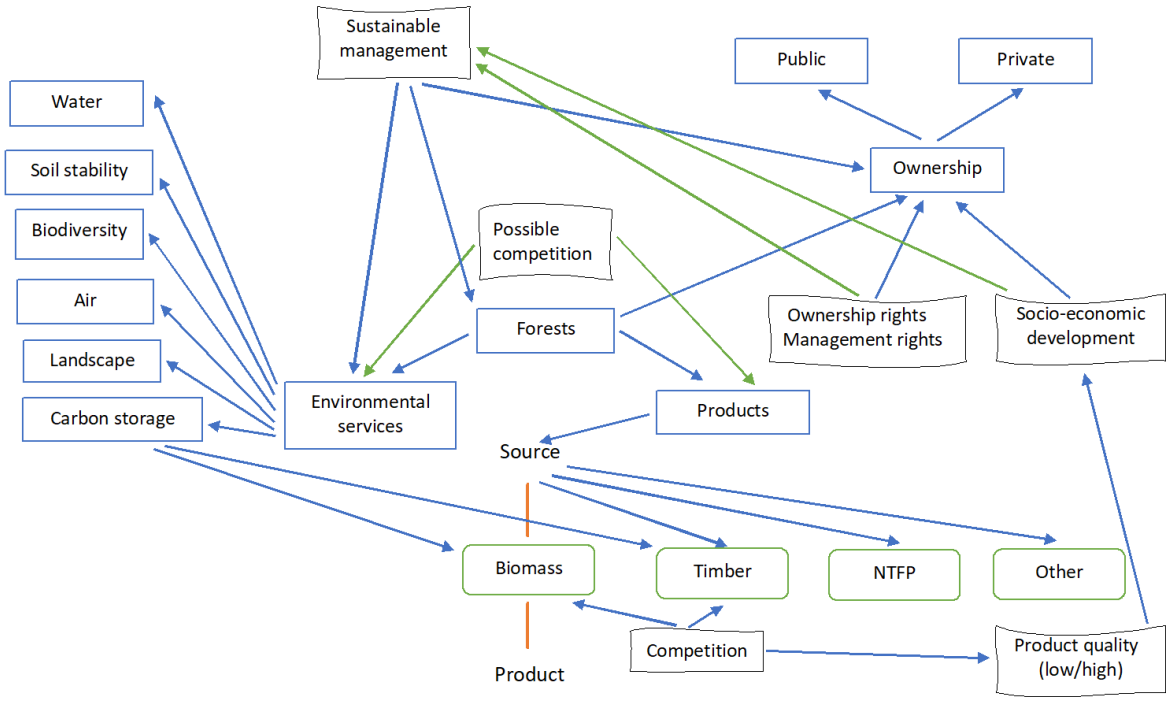


Figure 13 Forest - Biomass relation

The result of unsustainable forest management is overexploitation, leading to deforestation and forest degradation. Forest degradation and deforestation have been prevalent in the region and basin in the past (before and during the transition in 80's and 90's). The results are still visible through degraded areas. The current level of forest exploitation is more in balance with the annual regrowth, leading to less overexploitation. Notably, demographic changes due to urbanisation and abandonment of villages and reduced livestock grazing results in a natural reforestation of alpine pastures. Data from CORINE shows a limited decrease of forest areas between 2006 and 2012 of -0.5%, while it is increasing slightly for the period 2005-2015 (GWP-Med, 2017-I). The trend data obtained from UNECE (2015-III) provides a similar view (see Table 16 Forest resources trend). Reliability of data remains an issue, different resources provide often different data. Inaccurate data does occur. Still some forest degradation is shown in trends of forest stocks in Albania, although reducing (see Table 16). Trends are different for the specific countries: decreasing in Albania, increasing in Montenegro, stable in North Macedonia. According to the GWP-Med (2017-I) report, forest degradation is also increasing in Kosovo*.

Table 16 Forest resources trend

Total forest and other wooded land *(thousand ha)*					*(% of land area)*	
	2000	***2005***	***2010***	***2015***	***2010***	***2015***
Albania	1,030.5	1,043.0	1,043.0	1,237.2	36	43*
Montenegro	*744.1*	*744.1*	*964.3*	*964.3*	*72*	*72*
North *Macedonia*	*1,101.0*	*1,118.0*	*1,103.4*	*1,130.5*	*43*	*44*
*Kosovo**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Total growing stock (million m3)						
Albania	75	59	52	52		
Montenegro	*73*	*73*	121	121		
North Macedonia	*79*	*76*	*76*	*76*		
*Kosovo**	*N/A*	*N/A*	*N/A*	*N/A*		
Commercial/available for wood supply (million m3)						
Albania	*59*	*57*	*50*	*50*		
Montenegro	*68*	*68*	*105*	*105*		
North Macedonia	*79*	*76*	*76*	*76*		
*Kosovo**	*N/A*	*N/A*	*N/A*	*N/A*		

* Note that UNECE, 3rd Environmental Performance Review of Albania reports an estimated loss of forest cover of 20% in the past 25 years. (pg 23-25). The increased data reported in Albania is due to the national inventory that used different definitions from previous inventories.

Source: UNECE (2015-III)

Comparing data of wood and biomass harvest with data on actual use and consumption confirms that the forest exploitation is more sustainable compared to the past. The data on annual harvested fuelwood presented in Table 17 are based on data from the forestry institutions, when comparing this with data obtained from the energy sector (see Table 9 and Table 20) on consumption levels of fuelwood similar levels are shown.

Table 17 Harvest and use of fuelwood (total from forest and outside forest)

Combined data of harvest of fuelwood from forests with data from fuelwood harvested from trees from and along agriculture lands (hedgerows, woodlots and tree lanes)

Country level	Annual harvest fuel wood (total from forest and outside forest) (m^3/yr)	Use of fuelwood in the country (m^3/yr)
Albania	2,479,093	2,460,712
Kosovo*	2,268,000	2,265,000
Montenegro	783,000	753,853
North Macedonia	2,208,000	2,206,000
Total	**7,738,093**	**7,685,565**

Source: see Annex 1, Table 6 and Table 17
FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12

The total number of households using fuelwood in the riparian countries is 1.2 million, which is about 68% of the total households. This data comes from a study of the World Bank (2019). The average use of fuelwood per year is 6.4 m^3 (see Table 20). This average amount of fuelwood needed per household for heating is a generally accepted amount. Also, the percentage of households using fuelwood in the region (see Table 20Table 20) is a generally accepted level. It is reliable to use this for assessing the overall annual consumption of fuelwood. Based on these figures **the annual consumption of fuelwood for the riparian countries of the Drin Basin is 7.7 million m^3 fuelwood/year** (1.2 mln * 6.4 m^3). This corresponds with the data obtained from harvest and use (see Table 17). This however does not indicate that all wood harvest is accounted for, as illegal logging still takes place in the region for timber and fuelwood, contributing to uncontrolled and unsustainable forest management.

Table 18 Degraded forest areas

Indicator	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Albania	ha	n.a.	n.a.	n.a.	n.a.	210,625	210,456	210,456	210,387	210,383	210,382
Kosovo*	ha	n.a.	n.a.	n.a.	58.200	58,200	58,200	58,200	58,200	58,200	58,200
Montenegro	ha	30,532	35,303	70,161	70,129	69,973	72,735	73,226	93,828	96,443	96,443
North Macedonia	ha	41,722	49,942	44,818	43,348	43,346	42,854	42,915	44,356	44,559	44,376

Source: Annex 1, Table 20
Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*: MAFRD (2013) Kosovo* National Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro: http://monstat.org/userfiles/file/publikacije/godisnjak%202018/12.sumarstvo.pdf
North Macedonia: State Statistical Office (2015) Forestry 2014, agriculture statistics review, Government of the Republic of North Macedonia, http://www.stat.gov.mk

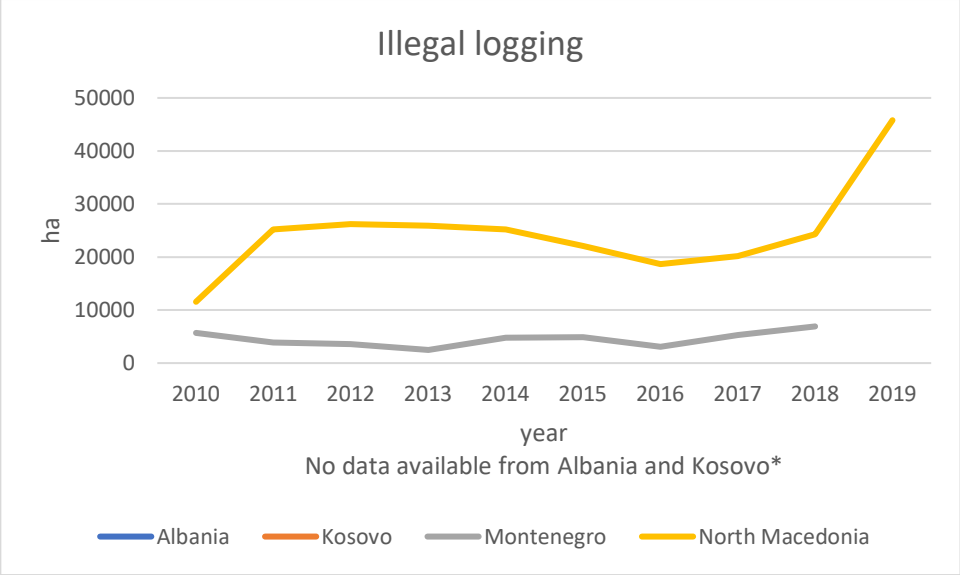


Figure 14 Illegal logging trends

Source: detailed data, Annex 1, Table 19

The nexus thematic report states that "All in all, forest degradation is a commonly observed phenomenon throughout the basin. Forests tend to be overexploited and degraded largely due to illegal, unrecorded, or poorly managed logging, which brings significant economic losses and environmental damage" (Strasser and Stec, 2017, pg 23-32). Forest degradation is high (see Table 18), especially in Albania, but remains stable over the recent years, except for Montenegro where degraded forest areas haven been increasing considerable in the past years. The levels of illegal logging remain relatively constant over the past years (see Figure 14 and Table 19). However, it must be noted that the official data are largely underestimated, while data for Kosovo* and Albania are not available at all. Illegal and uncontrolled logging are contributing to unsustainable management and related forest degradation and as a result diminishing the ability of forests to provide ecosystem services (UNECE, 2017).

Most illegal logging is driven by mismanagement (inefficient and insufficient control, forest administration and regulations) of forest resources and corruption. One of the issues with illegal logging is that official harvest and consumption estimates are lower than actual consumption (Nemeth et al, 2012). Proper figures and data are difficult to obtain and one should also distinguish between criminal illegal logging and administrative offence. In the case of criminal illegal logging forest products are obtained for which the person has no ownership or rights. The Balkan Peninsula is famous for its mountain and forest areas shared among many countries. Forest resources on the Balkans are very diverse, from alpine type of forests to boreal and Mediterranean coppice forests.

Ownership is also very different, from 10% of private forest in North Macedonia, to around 50% in Kosovo*, Montenegro and Serbia to 70% of communal forests in Albania. [12] Someone who has not the rights from the owner or forests managers is illegally harvesting forest products. This is a criminal offence, taking (another person's property) without permission or legal right. This is taking place especially in State forests, but occurs as well in private forests. The administrative offence differs from a criminal offence. In this case the person has the ownership and management rights of the forest resource, but is not complying with the administrative regulations set by authorities. For example a private forest owner harvests fuelwood from its own forest, but is not complying with the regulations for fees, documents and reporting on harvests set by the forestry authorities. This regarded an administrative offence. A private

[12] *http://refordcentre.org/documents/Forest%20certification%20Balkan%20Study.pdf*

forest owner might do this to avoid paying taxes and fees or to avoid the bureaucratic procedures. Data on illegal logging in the region does not provide a difference between the different types of illegal logging.

Table 19 Illegal logging

Country	Unit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Albania	m3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kosovo*	m3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	m3	5,671	3,927	3,573	2,476	4,757	4,900	3,118	5,294	6,912	n.a.
North Macedonia	m3	11,557	25,189	26,239	25,942	25,230	22,054	18,662	20,128	24,322	45,795
Source: see Annex 1, Table 7 North Macedonia: http://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__Zemjodelstvo__Sumarstvo/230_Sumar_Reg_Stetivoshumi_god_ml.px/table/tableViewLayout2/?rxid=8a5132b7-0de5-43ac-af53-05216839d462 Albania: not available Montenegro: http://www.monstat.org/userfiles/file/publikacije/godisnjak%202019/12.pdf Kosovo*: not available											

Ownership and management rights are often complicated in the region. The administrative and regulative procedures are in general State oriented in the region and focused on control. This differs from legislation oriented to sustainable forest management of resources, such as is a practice in many EU countries. These complicated ownership and management systems can be drivers of uncontrolled logging.

The land ownership titles are in general with men. Although inheritance laws provide equal rights to men and women, due to tradition and culture, land ownership titles are mainly provided to men. Women have often limited land titles. Agriculture land and especially forests are regarded a men's business. Due to the heavy work and remoteness mostly men work in forests. Engagement of women is large in non-wood forest products, however. Women are in general responsible for the household and in primary need for fuelwood, but the men are supplying. These unbalances may lead to constraints and un-even power and control over forest resources.

Another constraint is the type of product and the land use (see Figure 13). There is competition for biomass for energy with timber for example. Harvesting of timber comes with complicated, complex and administrative procedures and higher administrative fees. The region has in general a forest administration based on the past structures of State forest control and regulation, quite often centrally organised. This leads to bureaucratic and centrally steered forest administration. The control is focused on the forest products with fees and tariffs, much less on the quality of forests (sustainable forest management). This hampers the development of the forestry sector and endangers the sustainable management of forest resources.

To avoid bureaucratic procedures and regulations, insecurity in long term sustainable forest harvest, one avoids investing in the forest value chain and opts for the simple product. As a result, often wood that is used for fuelwood could have been used to produce technical wood. Wood is now used as fuelwood at a lower economic value, instead of placing it at the market for a higher value product as technical wood. Fuelwood is normally a low quality product as wood criteria are low for fuelwood. Using higher quality wood for a low quality product such a fuelwood has an influence on socio-economic development. The higher value for the product is not obtained reducing further value chain and product processing opportunities with higher economic gains compared to fuelwood. As explained earlier it also influences

the carbon storage. Using fuelwood releases carbon through emissions directly, while timber stores carbon for often several decades.

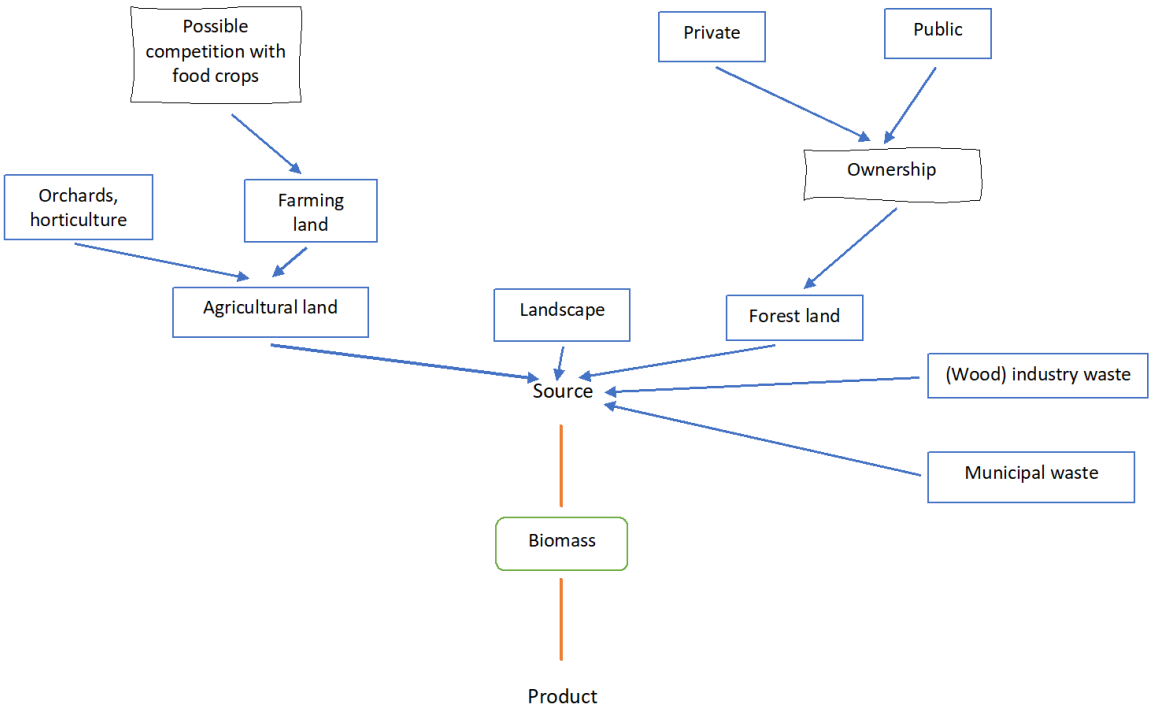


Figure 15 Land resources

Although not (yet) an actual issue in the region, there may be competition for land for growing biomass or food. When biomass demand and prices are increasing more people may consider investing in biomass production. It may also lead to a shift from food crops towards biomass produce on agricultural land. Fast growing trees species or certain biomass grasses can be used for this. The higher demand for biomass can also result in less forest with a timber production focus. Forest will be managed with a biomass production goal (obtaining the highest biomass growth) this will lead to more homogenous forests with a lower biodiversity.

An unstainable management and harvest of biomass will result in degraded forests leading to a decreased ability of forest to provide ecosystem services, such as biodiversity, soil cover and stability or water retention. Especially the ecosystem service for water resources is crucial in the Drin River Basin. Degraded forest as explained before will result to decreased water absorption of forest soils, and increased levels of soil erosion, run-off, sedimentation and floods.

5. Energy Biomass products

Biomass, including fuelwood is the most important resource for renewable energy in the region and in the Drin Basin. The basin with its large share of forests is an important contributor to the production of fuelwood. Fuelwood is widely and most commonly used for space heating at household level in the Drin Basin. There are however other biomass products as is shown in Figure 16.

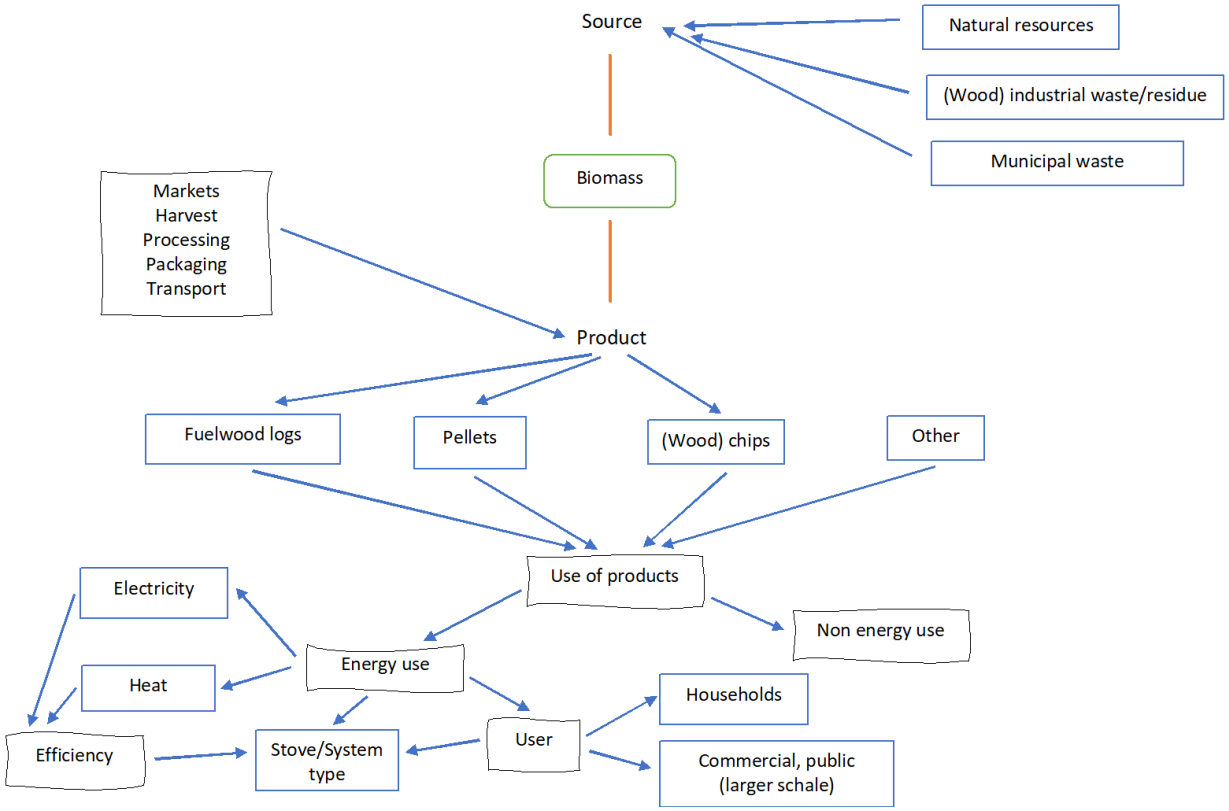


Figure 16 Product types

The consumption of firewood in households is widely spread in the region (see Table 20) and even with a wider availability and increased use of other renewable energy sources, fuelwood remains and will remain a major source, at least for space heating, in the near future. The reason for fuelwood use is driven mainly by an issue of limited availability, affordability of alternative fuels, as well as habits and tradition using fuelwood. Often people are not able to switch to alternative renewable energy source, even if these are more efficient, due to the high upfront investment costs needed to switch to alternative fuels. The investment costs in a new modern energy system are hampering and play a role in the use of fuelwood.

Table 20 Households fuelwood use

Households using fuelwood or biomass for heating or cooking

Drin Basin	Households using fuelwood or biomass for heating or cooking (#)	Share of total households in the country (%)	Average use of fuelwood by households for heating or cooking (m^3/yr)
Albania	480,155	66.5%	6.4
Kosovo*	271,187	74.6%	7.6
Montenegro	131,004	68.1%	5.5
North Macedonia	349,839	62.6%	6.2
Total	**1,232,185**	**68.0%**	**6.4**

Source: see Annex 1, Table 7
Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, www.instat.gov.al/en/themes/censuses/census-of-population-and-housing/#tab2
Kosovo*: MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
North Macedonia: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12

Other renewable biomass products are pellets and wood chips. Especially wood pellets are becoming more and more common. The use of processed biomass results in a higher efficiency, as it gives a higher caloric burning value compared to fuelwood. Initial advancements can be observed at different stages of the biomass energy value chain. There is an increasing consumption of pellets in households and the growing import of efficient pellet stoves. The use of pellets and improved stoves are mainly coming from import. There a few initiatives, often with external project support to produce local pellets and stoves. Local pellet production takes place in Montenegro and Albania (Meijboom, 2017) as well as in Kosovo* and there is a woodstove producer in North Macedonia (CNVP, 2014). When developing pellet production, a mechanism has to be in place to avoid it causing outsize pressure for logging. Pressure for increased logging (incl. in forests of high biodiversity value) has become a concern related to pellet production in South-Eastern US and in Northern Europe.[13] Another development is the valorization of various sources of biomass, e.g. some pellet production from vineyard debris. However, in general, the production of pellets in the riparian remains very low and limited to small private businesses.

There is only a limited amount of export of biomass from the basin. Some export takes place across borders within the basin as local informal trade. Export production is however, gradually increasing, not only driven by exports to EU, but also a result of growing demands in the region, most notably in Serbia and Bosnia and Herzegovina. The price of fuelwood has increased dramatically. Between 2015 and 2018, the price of firewood in the region grew threefold (from €20 to €60 for the stacked cubic metre) (FAO, 2019).

Often wood is burnt in inefficient stoves when traditional fuelwood logs are used. Modern woodstoves and pellet stoves are more efficient and consume less fuel, but are more expensive in purchase. The relationship of traditional use of unprocessed fuelwood with modern processed biomass fuels is described in Figure 17.

[13] *See Olesen et al (2016), Duden et al (2018) and Blok et al (2020)*

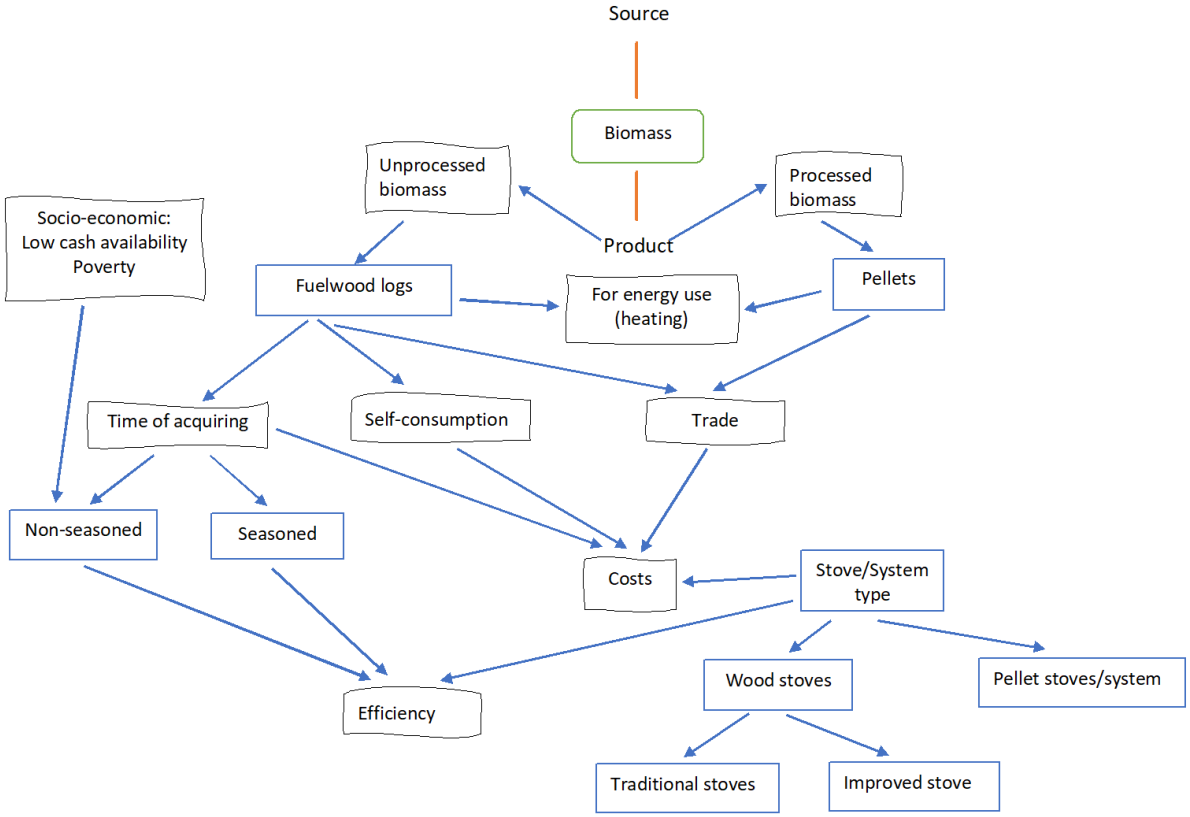


Figure 17 Relation processed - unprocessed biomass

Overall, a high use of fuelwood in households does not correspond to a modern and developed chain of biomass production and consumption. The use of fuelwood with traditional stoves consumes a far greater amount of biomass than processed products with higher calorific values and lower environmental impact (Strasser and Stec, 2017, pg 88).

Tradition, but also availability of fuelwood is a reason for its high use. Especially in rural areas many people harvest fuelwood for own consumption. Also others that purchase fuelwood do this often directly or on local markets. The shift towards modern types of stoves and other biomass fuels such as pellets or wood chips would require a relatively large investment that often is a hindrance to many people. Furthermore, people rely on fuelwood for their heating and often cooking. Shifting to another source will require a high level of security that it is available and for affordable prices. The choice for an investment in improved stoves and energy systems has also a gender perspective. The women are in general using the stoves and responsible for the household, having a higher interest in improved conditions, on the other side men maybe more responsible for larger investments and technology applied.

In forestry and rural development in general, male roles are associated with tasks that involve control over assets, mobility and decision-making and female roles typically involve manual pre- and postharvest work, high participation in forestry activities, in the collection of firewood and NTFP. This division of labour means women have limited access to and control over natural assets, resources and decision-making.

Women in rural areas can increase their role and participation in decision making processes and tenure rights, but in the region in general in rural areas women have limited participation in forestry related value chains and economic activities, there is poor recognition of property rights and lack of application and enforcement of gender and social inclusion legislation and regulations. Gender inclusion guarantees the engagement and participation of both men and women, by including women in activities of decision making and income-generation. Capacity building services can also serve as driver for growth and

empowerment of women, as well as direct support for organising woman in associations/producer groups for their economic empowerment[14].

The low level of economic development in especially rural areas, as is the case in the Drin Basin, is leading to the use of wet wood. People cannot afford to buy fuelwood 2 years in advance, which would provide proper drying of the fuelwood. Hence people just buy the fuelwood at the end of the summer before the start of the winter. Burning wet wood is inefficient and requires much more wood for the same caloric output.

The high use of fuelwood logs creates a serious problem of indoor and outdoor pollutions, which is often aggravated by the poor quality or conditions of the wood that is burnt (e.g. wet) or by the inefficiency of the stoves used.

[14] *CNVP – FLED project, PP on gender issues and gender strategy in Albania* https://www.gwp.org/globalassets/global/gwp-med-files/list-of-programmes/see-nexus/dec-2020/gender-workshop/cnvp_gender-in-forestry-2020.pdf

6. Policies related to Sustainable Biomass production and use

The natural resources in the Drin Basin offer a good opportunity to invest in the development of biomass. The use of biomass-based renewable energy provides benefits in terms of cleaner and more efficient energy and it would allow for rural development through the development of a more modern biomass value chain. It would allow for more processing, creating more job opportunities and providing a higher economic value. Although there might be export opportunities, the internal market having such a high focus on (biomass) fuelwood for energy will be the main offset. These benefits have, however, only a positive offset when the biomass is coming from sustainably managed resources and when the role and functioning of those natural resource to provide for ecosystem services is not compromised. The costs of diminished ecosystem services can outweigh the benefits of biomass from energy since increased forest and land degradation leads to the costs associated, for instance, to erosion, floods and sedimentation. Examples of cost are these related to damaged infrastructure, higher flood risks, reduced hydropower production, damaged agricultural land or irrigation cannels.

Proper policy providing guidelines, enabling environment, a legal and institutional framework are required. Currently the riparian countries promote the switch to efficient and cleaner biomass products, but this is not incentivized. However, North Macedonia started providing subsidies to citizens to procure pellet stoves to switch to cleaner energy sources (Balkan Green Energy News, 2018).

Sustainable forestry and biomass development has not a high priority the countries' development plans. Montenegro is an exception. There priority is given to its national forestry strategy and policy. The government took concrete political steps to address unsustainable forest exploitation (Strasser and Stec, 2017, pg 88).

Governance context; Policies and strategies

To support further development of the biomass sector governance, enabling environment is needed in several areas. These areas are in the fields of corresponding of the key critical issues, related to the natural resources, especially forestry, energy, water and climate. Along with this socio-economic aspects, the rural development ones are important. Annex 4 provides a long list of policy and strategy documents. In the next sections, the main ones are provided.

Forestry

Sustainable management of natural resources is a prerequisite to be able to develop the biomass sector. This is reflected in many policy and strategic documents, of which the policy and strategy for forestry are instrumental. The main strategy measures are:

- In Albania in its recent forest law (2020) sustainable management is regulated and safeguarding ecosystem services are protected.
- Albania's Forest Strategy calls for the promotion of industrial wood, including biomass for the production of pellets. To achieve this it stipulates the need to create the possibility to harvest biomass from forest through thinning from young forest stands and protection forests (MTE, 2018).

- North Macedonia, National Forest Strategy: Promote Sustainable Forest Management principals and develop a system of criteria and indicators for their implementation in real forest (MAFWE, 2006).
- The forestry policy from Montenegro indicates the need for research, especially of the role of forests in mitigating climate changes, adjustment of forests to climate changes, and functioning of forest eco-system, protection of biodiversity, use of timber and biomass, relation between forests and water, competitiveness, rural development (MAFWM, 2008).
- Additionally this policy provides the following measures: coppice management system for biomass will be further developed, promotion of timber products as construction material and a source of energy, pilot project for biomass based heating and the promotion of construction of biomass heating plants (MAFWM, 2008).
- Kosovo* want to take measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors) and mobilize new biomass sources. It has identified several issues:
  (a) No data is available on the level of degradation of agricultural and forest lands.
  (b) No data is available on the surface of unused arable land.
  (c) No measures are yet proposed for the encouragement of use of non-arable land, degraded land, etc. for purposes of energy culture cultivation.
  (d) No use of primary materials is planned (such as animal fertilizer) for energy uses.
  (e) The encouragement of production and use of biogas is leveraged through state policies – the feed-in tariff for biogas.
  (f) In relation to the planning of measures for the improvement of techniques for forest management, the Forestry Development Strategy 2010-2020 foresees a project for forest management advancement (MED, 2013).
- Additionally this policy indicates the following:
  (a) At the moment no monitoring scheme exists for the impact of biomass used in energy generation on agriculture and forestry sector.
  (b) No information is available regarding the developments expected in other sectors based on agriculture and forestry that may have an impact on energy-related utilization (MED, 2013).

Related is the combat against illegal logging. Some of the measures to address this are:

- For a large share of the population fuelwood effectively ensures the energy security in the household. In Albania authorities have imposed a total ban on (industrial) logging. The cutting of wood for own consumption (fuelwood) remains excluded (Strasser and Stec, 2017, pg 30, 31.)

Other aspects related to development socio-economic development and development of the value chain of biomass:

- In North Macedonia the Ministry of Agriculture and Forestry within its forestry strategy (2006) has a goal of establishment of economically viable forest industry in line of the wood supply and demand. One of the measures is promoting and implementing affordable wood biomass based energy technologies
- The Rural Development Strategy of North Macedonia indicates the investment needs for forest management: introduce sustainable and economically viable forest management practices for protection and utilization of forests and biomass (Government of North Macedonia, 2014)
- North Macedonia has unused potential for the production of energy crops as well as quantities of residues from agriculture production (Government of North Macedonia, 2014).

- The Government of Kosovo* aims for development of “Renewable Energy Sources (RES) represent an important source of energy in Kosovo*, with a highly underutilized potential. The use of RES in energy generation represents a long-term target for the implementation of three energy policy milestones of the country: support of overall economic development; increased security of energy supply; and environmental protection. In view of these milestones, it is necessary to apply fiscal and financial incentives for all types of RES including the implementation of the support scheme based on the mechanism of the certificates of origin. To encourage the use of RES, Kosovo* has defined a support scheme through feed-in tariffs for hydropower, wind energy, photovoltaic energy, and biomass. This incentive measure for RES aims to fulfil the planned energy targets for RES for 2020, as a requirement of EU Directive 2009/28/EC, the transposition and implementation of which shall be subject to monitoring by the Energy Community” (MED, 2018-I).

Energy

Biomass for energy is a renewable energy source. Policies, strategies and legislation increasingly promote the use of renewable energy and create a framework to support this:

- The National Energy Strategy of Albania calls for a maximal use of biomass, at low costs and limited costs for the environment. How to support this use of biomass is not concretized (National Energy Agency, 2003)
- In North Macedonia the basic legal elements for renewable energy and the promotion of renewable energy are provided in the Law on Energy (Official Gazette of the Republic of Macedonia No. 63/2006, 36/2007, 106/2008).
- The Strategy on Energy of North Macedonia only plans for a future increase for waste biomass for combined heat and power generation. This is however not concretized and there are no specific goals and measures for other biomass utilisation of development (ME, Strategy, 2010)
- Montenegro through its National Forest Strategy aims to increase demand for biomass by introducing heating of public buildings with wood chips and cogeneration, and it also aims to invest in sustainable forest management of private and State forests (MARD, 2014).
- In its National Renewable Energy Strategy Montenegro promoted the use of energy efficient technology such as biomass boilers. It want to achieve this through interest-free credit line for installation of heating systems on modern biomass fuels (pellets, briquettes) for households (Government of Montenegro, 2009).
- Kosovo* aims in its policy and strategy paper for the development of the forestry sector for an efficient manner of production and utilization of wood biomass for heating purposes (MAFRD, 2009).
- In line with this Kosovo* will support the development of wood biomass market, taking into account the forms of its use such as pellets and briquettes. It also wants to construct a new co-generation plant based on biomass (16.5 MWt/1,5MWe) (MED, 2018-II).
- Wood biomass for energy is the main source in the basin, but other resources could be interesting. The majority of biomass is obtained directly from natural resources. Additional industrial residue from wood processing is used for biomass energy. Other biomass from municipal waste or other residues from industrial production process can significantly contribute in the total energy generation from biomass (ME, 2010, pg 38). Clear policies, strategies and practices are lacking in the basin region.

Water and Climate

- To support climate change mitigation in utilising renewable energy among biomass, Kosovo* declares in its national Energy Strategy: “Renewable Energy Sources also comprise an important segment of Kosovo*’s energy sector, which improves the security of energy supply, increases economic growth, diversifies sources of usable energy, and reduces CO_2 emissions, thus protecting the environment. The use of such resources for energy generation is a long-term objective, which must take into account the obligations arising from the Energy Community Treaty and the Stabilisation and Association Agreement. As a party to this Treaty, Kosovo* is obliged to meet targets for the share of energy from RES in the gross final consumption of energy for the period up to 2020, pursuant to EU Directive 2009/28/EC and in accordance with the Decision of the Council of Ministers of the Energy Community D/2012/04/MC-EnC. This share is in line with the required target of 25% which is projected to be completed by available resources: hydropower; solar energy; solid biomass and other forms of biomass; wind power; and biofuels used in transport for consumption” (MED, 2018-I).

7. Recommendations

The following recommendations are formulated based on the biomass and forestry review for the Drin River Basin Nexus. The package of solutions is provided following the 5 I's framework; Institutions, Information, Instruments, Infrastructure and International cooperation.

Institutions

- Sustainable management and use of natural resources is a pre-requisite for the sustainable harvest of biomass from natural resources within the basin. There is a direct relationship between the natural resources, especially forests and the provision of multiple ecosystem services, such as the provision of sufficient water and water quality. Institutions responsible for natural resources, such ministry of environment and/or forestry should assure a proper regulative and legislative framework assuring and monitoring the sustainability of natural resources (SAP Goal 2, sub-objective 2.4).
- River Basin Management planning and implementation must be imbedded in government structures at national and regional level, at natural resource management level and (rural) economic development, including international cooperation with counterparts within the basin.
- To address sustainable forest (and natural) resource management a river basin approach is needed for water management, ecosystem management, including forests. This is required since the effects of unstainable forest use or over exploitation have a direct impact on water quality and water availability leading to floods, erosion and related damages and costs are throughout the basin (SAP Goal 2, sub-objective 2.3, 2.4 and 2.5)
- Establish standards for sustainable use of forest resources and on wood pellets. For example through forest certification schemes (FSC or PEFC), chain of custody and product standards such as European Union standards on solid fuels including wood pellets (NEN-EN-ISO 17225-2 determines the fuel quality classes and specifications of graded wood pellets for non-industrial and industrial use). North Macedonia has a good experience in forest certification and chain of custody for PEFC[15].

Information

- Trainings would be beneficial to design and conduct on practices of sustainable forest management to ensure sustainable use of biomass and mitigation of potential harm to soils and water resources. Focus should be provided to all stakeholders involved, with specific attention to forest managers, but also to farmers (men and women).
- Ensure input by forestry experts to studies foreseen by the Drin Basin SAP on erosion hotspots, trends on biodiversity, ecosystem services and in drafting respective management related recommendations (SAP Goal 2, Sub-Objectives 1.3, 1.5).
- Study on Payment for Ecosystem Services (PES) opportunities within river basins approaches including schemes and practices. Use can be made of experiences such as made in Albania for the Ulza Watershed on PES[16]
- Awareness and extension services should be launched for efficient and renewable energy use through wood biomass (SAP Goal 2, Objective 4).

[15] http://www.cnvp-eu.org/eng/project.php?mv=10&id=940
[16] *Blinkov and Kampen (2014)*

Instruments

- Create incentives to forest owners/managers for forest planting, especially in areas vulnerable to erosion that may otherwise lead to damages in the transboundary basin downstream through floods and transport of sediments.
- Launch pro-poor initiatives in the basin area to support households obtaining timely seasoned firewood to avoid using fresh firewood for heating.
- Create incentives for wood industries for creating longer lasting wood products, having both economic benefit through more value created, but also having a climate mitigation effect as longer lifespan will keep carbon sequestrated for a long period. Supporting wood processing industry to develop construction wood for example cross laminated timber, or furniture.
- Sustainable use of forest especially of wood products should not only focus on biomass, but address the total range of products and for the whole forestry and wood industry. In choosing for wood products priority needs to be given to the higher valuable and longer lasting products. This has an economic benefit as well a climate mitigation effect, in which products with a longer lifespan such as timber and construction wood will keep carbon sequestrated for a long period of time against biomass products which is often at a lower economic value and releasing carbon directly. This action supports the EU acquis chapter 15 on energy, in which renewable energy is supported, including biomass (EU, 2019)
- Efforts should be made to have suitable systems available for rural areas as well, including sufficient service and maintenance support as well as availability of processed biomass products locally for an affordable price.
- Establish Payment for Ecosystem Services (PES) within river basin approaches to assure sustainable natural resource management. For example, downstream water users paying for improved forest management or reforestation upstream.

Infrastructure and investments

- With support through the Instrument for Pre-accession Assistance (IPA III) becoming soon available for 2021-2027 from the EU, the priorities and operational rules at national level shall be established in Albania, Montenegro, North Macedonia and Kosovo* to support sustainable use of natural resources and biomass (in line with chapter 11 of the EU acquis on agriculture and rural development, requiring Adequate administrative capacity of the agricultural administrations, in particular in the area of agricultural policy formulation, analysis, implementation, support payment and control (EU, 2020).
- In practical terms, measures could be designed to support (a) forest restorations and Sustainable Forest Management practices (b) Sustainable wood harvest practices for small forest holders, (c) SMEs in expanding production of processed biomass products (pellets, woodchips, briquettes) for local consumers and related heating and/or combined heat and power systems, (d) investments by consumers for a switch from firewood to processed biomass products.
- Identify options for establishing cooperation with developmental and commercial banks for the development of micro-credit options/soft loans for households, businesses and public organizations to shift into alternative heating fuels (e.g. pellets, briquettes) as market-based measures to reduce illegal forest exploitation listed in the Drin Basin SAP (Goal 2, Sub-Objectives 1.6).
- Value chain development for biomass should include a gender perspective to address the specific needs and opportunities of women and disadvantage groups, both to benefit from the biomass value chain as to participate in it. This is in line with the EU acquis on agriculture and rural development (chapter 11) in which at agricultural market level, setting up of market mechanisms, including marketing standards, price reporting, quota management, producer organisations and public intervention are required (EU, 2020).

- Small and Medium-Sized Enterprise development support is recommended within the biomass value chain to support the further development and use of these renewable energy sources. Support is required within processing, product development (pellets, briquettes, wood chips), trade and transport as well as for the energy and heating systems and/or combined heat power systems.
- Support for biomass production should be done sensitive for other alternatives, biomass production should not compete with agricultural crops, opportunities exist in marginal or waste lands, nor endanger preservation of forests with high biodiversity value.
- A pro-poor initiatives could be set up in the basin area to support households in obtaining timely seasoned firewood to avoid using fresh firewood for heating.

<u>International cooperation</u>

- Coordinating at regional level renewable energy, biomass markets, the renewable energy transition, wood and agro-products markets in general.
- Sustainable forest (natural) resource management should be properly integrated into national policies, as well as in regional cooperation and communication in the Drin River Basin countries.
- Clear interlinkages existing between the different spheres (natural resources, water, energy, food) and their link to climate change need to be translated, defined and agreed among relevant sectors/stakeholders at regional, national and local level to concrete actions in order to enable an environment for safeguarding the ecosystem services through the implementation of sustainable forest (natural) resource management.

The following figure (see Figure 18) provides a synthesis of the interlinkages with the key indicators and the summarized recommendations.

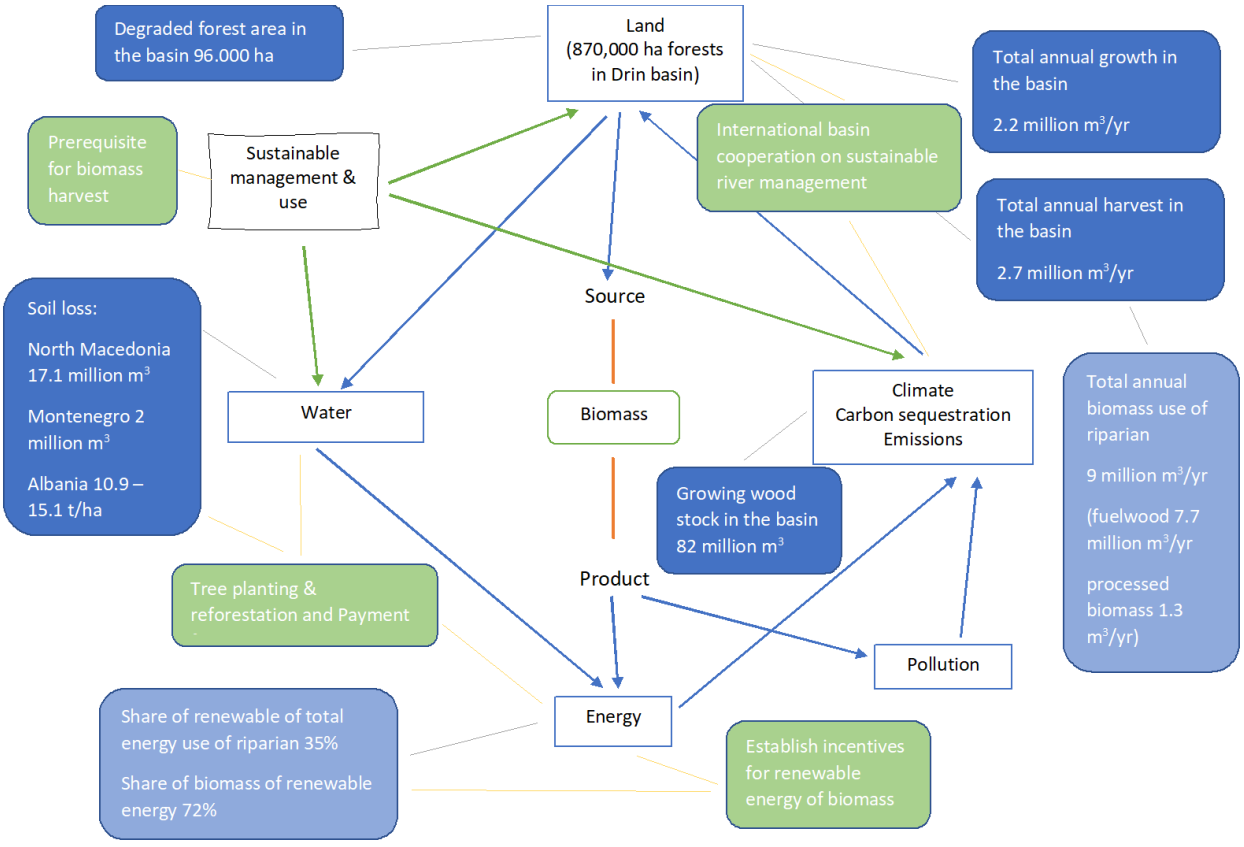


Figure 18 Concluding synthesis

Key indicators blue, recommendations green

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Annexes

Annex 1 Data

This annex provides the data used within the analysis. All data is obtained from existing sources through the desk study. For each data set the specific references are provided.

Table 1 Basin area

Country - Basin area

Country	Total country area (ha)	Share of total country area in the Basin (%)	Area within the basin (ha)
Albania	2,874,800	27%	772,400
Kosovo*	1,090,800	42%	456,700
Montenegro	1,381,200	32%	437,700
North Macedonia	2,571,300	13%	329,500
Total	**7,918,100**	**25%**	**1,996,300**

Source: *GWP-Med, Thematic Report on Socio-Economics of the Extended Drin River Basin, 2017*

This data of the area of the basin is provided in the first phase of the nexus assessment and is used as a basic reference for this study. It provides the relative share of the basin area of the total country area. This relative reference is used to transfer country level data to basin level.

Table 2 Forest area

Forest area

Drin Basin	Total Forest area (ha)	Share of Forest of total land area (%)	Share of total country area in the Basin (%)	Total country area (ha)	Relative Forest area in the Basin (ha)	Reference
Albania	1,051,843	38.2%	27%	2,874,800	283,998	http://www.instat.gov.al/en/themes/agriculture-and-fishery/forests/publication/2020/forest-statistics-2019/
Kosovo*	481,000	44.7%	42%	1,090,800	202,020	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina http://www.instat.gov.al/media/7171/statistical-yearbook-2019 .pdf
Montenegro	826,782	59.5%	32%	1,381,200	264,570	Dees, Mathias et. Al (2013) National Forest Inventory of Montenegro, Ministry of Agriculture, Forestry and Rural Development, WISDOM, FAO
North Macedonia	1,007,095	39.0%	13%	2,571,300	130,922	State Statistical Office (2020) Forestry, agriculture statistics review, Government of the Republic of North Macedonia, Republic of Macedonia State Statistical Office; https://www.stat.gov.mk/PrikaziPoslednaPublikacija_en.aspx?id=34
Total	**3,366,720**	**45.4%**	**25%**	**7,918,100**	**881,510**	

Since this is calculated as a relative forest area based on the share of the basin, the figures can only be used as an indication and are rounded to the nearest 10.000.

Drin Basin	Total Forest area (ha)	Share of Forest of total land area (%)	Share of total country area in the Basin (%)	Total country area (ha)	Relative Forest area in the Basin (ha in ten thousands)
Albania	1,051,871	38.2%	27%	2,874,800	280,000
Kosovo*	481,000	44.7%	42%	1,090,800	200,000
Montenegro	826,782	59.5%	32%	1,381,200	260,000

North Macedonia	1,007,095	39.0%	13%	2,571,300	130,000
Total	**3,366,720**	**45.4%**	**25%**	**7,918,100**	**870,000**

Table 3 Trees and Woodlots area

Trees and woodlots outside forests areas (ha)

Drin Basin	Relative Forest area in the Basin (ha)	Trees and woodlots outside forests areas (ha)	Trees and woodlots outside forests areas (ha) in Basin	Reference
Albania	280,000	688,464	190,000	INSTAT (2019) Statistical Yearbook 2019, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/en/themes/agriculture-and-fishery/forests/publication/2020/forest-statistics-2019/
Kosovo*	200,000	499,600	210,000	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	137,480	40,000	FAO (2013) The First National Forest Inventory of Montenegro – Final Report, FAO WISDOM, Dees Mathias, et al.
North Macedonia	130,000	418,752	50,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Total	**870,000**	**1,744,296**	**490,000**	

Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
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North Macedonia: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12

Trees and woodlots outside forests areas (ha)

Table 4 Annual Harvest Wood Products

Drin Basin	Annual harvest timber (m3/yr) in Basin	Annual harvest timber (% of total)	Annual harvest fuel wood (m^3/yr) in Basin	Annual harvest fuel wood (% of total)	Annual harvest biomass wood (m^3/yr) in Basin	Annual harvest biomass wood (% of total)	Total annual harvest (m^3/yr) in Basin
Albania	20,000	2.5%	670,000	82.7%	120,000	14.8%	810,000
Kosovo*	90,000	7.1%	950,000	74.8%	230,000	18.1%	1,270,000
Montenegro	40,000	13.8%	250,000	86.2%	0	0.0%	290,000
North Macedonia	40,000	12.1%	290,000	87.9%	0	0.0%	330,000
Total	**190,000**	7.0%	**2,160,000**	80.0%	**350,000**	13.0%	**2,700,000**

Reference
FAO database and FAO WISDOM:http://www.fao.org/faostat/en/#data/FO
MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
WISDOM Montenegro, FAO, and http://www.fao.org/faostat/en/#data/FO
WISDOM North Macedonia, FAO, Rome 2018. and FAO forest products database

Table 5 Biomass from Agriculture

Biomass from agriculture (tonnes/yr)

Drin Basin	Biomass from agriculture (tonnes/yr)	Biomass from agriculture in Basin (tonnes/yr)	Biomass from agriculture used for energy (tonnes/yr)	Share of biomass from agriculture used for energy (%)	Reference
Albania	262,000	70,000	5,240	2.0%	World Bank (2017) Biomass-Based Heating in the Western Balkans, A Roadmap for Sustainable Development, https://documents.worldbank.org/en/publication/documents-reports/documentdetail/135831542022333083/biomass-based-heating-in-the-western-balkans-a-roadmap-for-sustainable-development
Kosovo*	207,354	90,000	3,100	1.5%	
Montenegro	8,154	3,000	0	0.0%	
North Macedonia	72,636	10,000	2,905	4.0%	
Total	**550,144**	**173,000**	**11,245**	**1.9%**	

Table 6 Use of fuelwood or biomass for energy

Use of fuelwood or biomass for energy (m^3/yr)

Drin Basin	Use of fuelwood in the country (m^3/yr)	Use of fuelwood (m3/yr) in the Basin	Use of processed biomass in the country (m^3/yr)	Use of processed biomass (m3/yr) in the Basin	Reference
Albania	2,460,712	660,000	200,755	50,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Kosovo*	2,265,000	950,000	329,550	140,000	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	753,853	240,000	426,617	140,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
North Macedonia	2,206,000	290,000	306,360	40,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Total	**7,685,565**	**2,140,000**	**1,263,282**	**370,000**	

Woody biomass is defined as the biomass excluding the fuel wood

Table 7 Households using fuelwood or biomass for energy

Households using fuelwood or biomass for heating or cooking

Drin Basin	Number of households using fuelwood or biomass for heating or cooking (#)	Share of total households in the country (%)	Average use of fuelwood by households for heating or cooking (m^3/yr)	Reference
Albania	480,155	66.5%	6.4	INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, www.instat.gov.al/en/themes/censuses/census-of-population-and-housing/#tab2
Kosovo*	271,187	74.6%	7.6	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	131,004	68.1%	5.5	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
North Macedonia	349,839	62.6%	6.2	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Total	**1,232,185**	**68.0%**	**6.4**	

Table 8 Growing stock (standing volume) wood biomass in forests

Growing stock

Drin Basin	Relative Forest area in the Basin (ha)	Growing stock (standing volume m^3)	Growing stock (standing volume m^3) in Basin	Reference
Albania	280,000	54,925,000	15,000,000	Institute for Statistics (INSTAT): file:///C:/Users/brank/Downloads/forest-statistics-2018.pdf
Kosovo*	200,000	40,508,000	17,000,000	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	122,000,000	39,000,000	National Forest Inventory, WISDOM Montenegro, FAO, 2013
North Macedonia	130,000	87,779,890	11,000,000	WISDOM North Macedonia, FAO, Rome 2018.
Total	**870,000**	**305,212,890**	**82,000,000**	

Table 9 Annual Growth wood biomass in forest

Annual Growth

Drin Basin	Relative Forest area in the Basin (ha)	Annual growth (wood volume over bark, m^3)	Annual growth (wood volume over bark, m^3) in Basin	Annual growth/ha (wood volume over bark m^3/ha/yr)	Reference
Albania	280,000	1,414,567	380,000	1.34	INSTAT and FAO WISDOM
Kosovo*	200,000	1,556,000	650,000	3.20	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	2,793,703	890,000	3.38	National Forest Inventory, WISDOM Montenegro, FAO, 2013
North Macedonia	130,000	1,723,362	220,000	1.75	WISDOM North Macedonia, FAO, Rome 2018.
Total	**870,000**	**7,487,632**	**2,140,000**	**2.42**	

Table 10 Trees and woodlots outside forests

Trees and woodlots outside forests areas (ha)

Drin Basin	Relative Forest area in the Basin (ha)	Trees and woodlots outside forests areas (ha)	Trees and woodlots outside forests areas (ha) in Basin	Reference
Albania	280,000	688,464	190,000	Institute for Statistics (INSTAT): file:///C:/Users/brank/Downloads/forest-statistics-2018.pdf
Kosovo*	200,000	499,600	210,000	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	137,480	40,000	National Forest Inventory, WISDOM Montenegro, FAO, 2013
North Macedonia	130,000	418,752	50,000	WISDOM North Macedonia, FAO, Rome 2018.
Total	**870,000**	**1,744,296**	**490,000**	

Table 11 Annual Growth wood biomass in trees and woodlots outside forests

Trees and woodlots outside forests annual growth (m^3/yr)

Drin Basin	Relative Forest area in the Basin (ha)	Trees and woodlots outside forests annual growth (m^3/yr)	Trees and woodlots outside forests annual growth (m^3/yr) in Basin	Reference
Albania	280,000	167,314	50,000	Biomass-Based Heating in the Western Balkans, World Bank: http://documents.worldbank.org/curated/en/135831542022333083/Biomass-Based-Heating-in-the-Western-Balkans-A-Roadmap-for-Sustainable-Development
Kosovo*	200,000	25,781	10,000	Biomass-Based Heating in the Western Balkans, World Bank: http://documents.worldbank.org/curated/en/135831542022333083/Biomass-Based-Heating-in-the-Western-Balkans-A-Roadmap-for-Sustainable-Development
Montenegro	260,000	35,000	10,000	Biomass-Based Heating in the Western Balkans, World Bank: http://documents.worldbank.org/curated/en/135831542022333083/Biomass-Based-Heating-in-the-Western-Balkans-A-Roadmap-for-Sustainable-Development
North Macedonia	130,000	198,876	30,000	WISDOM North Macedonia, FAO, Rome 2018
Total	**870,000**	**426,971**	**100,000**	

Table 12 Degraded forests

Degraded forest area

Drin Basin	Relative Forest area in the Basin (ha)	Degraded forest in the country (ha)	Degraded forest in Basin (ha)	Share of degraded forest in Basin (%)	Reference
Albania	280,000	210,383	60,000	21%	INSTAT (2019) Statistical Yearbook 2019, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/en/themes/agriculture-and-fishery/forests/publication/2020/forest-statistics-2019/
Kosovo*	200,000	58,200	20,000	12%	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	30,532	10,000	4%	FAO (2020) Country Report Montenegro, Global Forest Resources Assessment 2020, Rome, http://www.fao.org/3/cb0029en/cb0029en.pdf
North Macedonia	130,000	43,346	6,000	4%	State Statistical Office (2020) Forestry 2020, agriculture statistics review, Government of the Republic of North Macedonia, https://www.stat.gov.mk/PrikaziPosledna Publikacija_en.aspx?id=34
Total	**870,000**	**342,461**	**95,000**	**11%**	

Table 13 Energy use

Energy use and type of energy use

Drin Basin	Energy use per country (GWh/yr)	Energy use fossil fuel per country (GWh/yr)	Share of energy use of fossil fuel (%)	Energy use renewables per country (GWh/yr)	Share of energy use of renewables (%)	Energy use biomass per country (GWh/yr)	Share of energy use of biomass (%)	Share of biomass use of renewables (%)
Albania	28,994	15,309	52.8%	13,685	47.2%	7,582	26.2%	55.4%
Kosovo*	19,514	13,786	70.7%	5,728	29.4%	5,663	29.0%	98.9%
Montenegro	8,897	5,508	61.9%	3,389	38.1%	1,750	19.7%	51.6%
North Macedonia	25,668	19,382	75.5%	6,286	24.5%	5,832	22.7%	92,7%
Total	**83,073**	**53,985**	**65.0%**	**29,088**	**35.0%**	**20,827**	**25.1%**	**71.6%**

	Reference: https://www.iea.org/data-and-statistics?country=WORLD&fuel=Energy%20supply&indicator=TPESbySource And additional use for real biomass data: FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
AL	https://www.iea.org/data-and-statistics?country=ALBANIA&fuel=Energy%20consumption&indicator=TFCbySource
KO	https://www.iea.org/data-and-statistics?country=KOSOVO*&fuel=Energy%20consumption&indicator=TFCbySource
MNE	https://www.iea.org/data-and-statistics?country=MONTENEGRO&fuel=Energy%20consumption&indicator=TFCbySource
MK	https://www.iea.org/data-and-statistics?country=NORTHMACED&fuel=Renewables%20and%20waste&indicator=SDG72

Table 14 Growing stock

Growing stock

Drin Basin	Relative Forest area in the Basin (ha)	Growing stock (standing volume m^3)	Growing stock (standing volume m^3) in Basin	Reference
Albania	280,000	54,925,000	15,000,000	INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*	200,000	40,508,000	17,000,000	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	122,000,000	39,000,000	FAO (2013) The First National Forest Inventory of Montenegro – Final Report, FAO WISDOM, Dees Mathias, et al.
North Macedonia	130,000	87,779,890	11,000,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Total	**870,000**	**305,212,890**	**82,000,000**	

Table 15 Sector Contribution to GDP

Sector contribution to GDP

Drin Basin	Contribution to GDP of forestry sector (mln €)	Share of forestry to GDP (%)	Contribution to GDP of agriculture sector (mln €)	Share of agriculture to GDP (%)	Reference
Albania	€ 31.1	0.3%	€ 21.4	19.6%	http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf and http://www.fao.org/forestry/country/57033/en/alb/, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*	€ 24.0	0.4%	€ 70.6	10.5%	http://seerural.org/wp-content/uploads/2017/03/Annex-8-Kosovo*-trends-and-gaps.pdf, https://ask.rks-gov.net/media/4087/statisti%C4%8Dki-godi%C5%A1njak-republike-kosova-2017.pdf
Montenegro	€ 6.3	0.1%	€ 307.6	6.6%	MONSTAT: https://www.monstat.org/cg/page.php?id=19&pageid=19 and Forest Directorate, MONSTAT: https://www.monstat.org/cg/page.php?id=19&pageid=19
North Macedonia	€ 30.0	0.3%	€ 855.5	8.7%	Estimation based on WISDOM Macedonia and Statistical office: GROSS DOMESTIC PRODUCT publication, Statistical office: GROSS DOMESTIC PRODUCT, 2016 and WISDOM Macedonia
Total	**91.4**	**0.3%**	**€ 1,255.2**	**11.4%**	

Table 16 Forest types

Drin Basin	Relative Forest area in the Basin (ha)	Broadleaf in Basin (ha)	Coniferous in Basin (ha)	Mixed in Basin (ha)	Other in Basin (ha)	Reference
Albania	280,000	140,000	40,000	100,000	0	INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf
Kosovo*	200,000	190,000	10,000	3,000	0	MAFRD (2013) Kosovo* National Forestry Inventory 2012, Government of the Republic of Kosovo*, Pristina
Montenegro	260,000	200,000	60,000	50,000	0	FAO (2013) The First National Forest Inventory of Montenegro – Final Report, FAO WISDOM, Dees Mathias, et al.
North Macedonia	130,000	80,000	10,000	40,000	6,000	State Statistical Office (2015) Forestry 2014, agriculture statistics review, Government of the Republic of North Macedonia, http://www.stat.gov.mk
Total	**870,000**	**610,000**	**120,000**	**193,000**	**6,000**	

Table 17 Fuelwood harvest

Annual harvest fuel wood (total from forest and outside forest)

Country level	Relative Forest area in the Basin (ha)	Annual harvest fuel wood (total from forest and outside forest) (m^3/yr)	Annual harvest fuel wood (m^3/yr) in Basin	Reference
Albania	280,000	2,479,093	670,000	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO visited 2020-09-12
Kosovo*	200,000	2,268,000	950,000	
Montenegro	260,000	783,000	250,000	
North Macedonia	130,000	2,208,000	290,000	
Total	**870,000**	**7,738,093**	**2,160,000**	

Table 18 Wood products Export

Drin Basin	Fuelwood (m^3)	% of total annual harvest fuelwood	Pellets (tonnes)	Woodchips, residues	Roundwood (m^3)	Sawn and processed wood (m^3)	Reference
Albania	22,866	3.4%	12,272	0	0	0	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO
Kosovo*	No data available Wood industry produces largely for internal market (>90%)						MTI (2014) Sector Profile of Wood Industry, Ministry of Trade and Industry, Government of The Republic Kosovo*
Montenegro	552	0.5%	37,155	99,818	242	245,491	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO
North Macedonia	34	0%	738	0	0	7607	FAO (2020) WISDOM database: http://www.fao.org/faostat/en/#data/FO
Total	**23,452**	**1.0%**	**50,165**	**99,818**	**242**	**253,098**	

Table 19 Illegal logging trends

Illegal logging trends (m^3)										
Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Albania	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kosovo*	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Montenegro	5,671	3,927	3,573	2,476	4,757	4,900	3,118	5,294	6,912	n.a.
North Macedonia	11,557	25,189	26,239	25,942	25,230	22,054	18,662	20,128	24,322	45,795
Country	**Source**									
Albania										
Kosovo*										
Montenegro	http://www.monstat.org/userfiles/file/publikacije/godisnjak%202019/12.pdf									
North Macedonia	http://makstat.stat.gov.mk/PXWeb/pxweb/mk/MakStat/MakStat__Zemjodelstvo__Sumarstvo/230_Sumar_Reg_Stetivoshumi_god_ml.px/table/tableViewLayout2/?rxid=8a5132b7-0de5-43ac-af53-05216839d462									

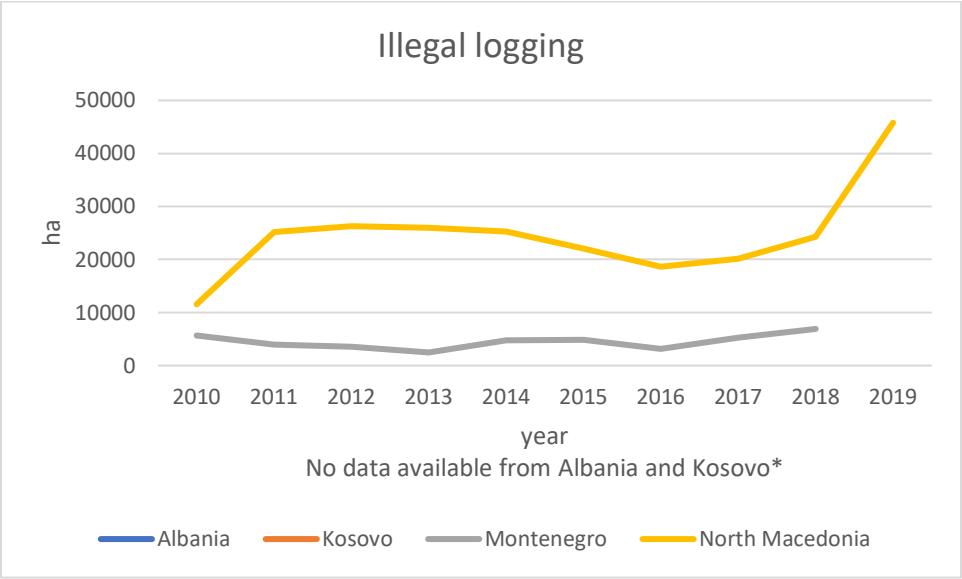


Table 20 Degraded forest areas

Degraded forest area (ha)										
Indicator	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Albania	n.a.	n.a.	n.a.	n.a.	210,625	210,456	210,456	210,387	210,383	210,382
Kosovo*	n.a.	n.a.	n.a.	58.200	58,200	58,200	58,200	58,200	58,200	58,200
Montenegro	30,532	35,303	70,161	70,129	69,973	72,735	73,226	93,828	96,443	96,443
North Macedonia	41,722	49,942	44,818	43,348	43,346	42,854	42,915	44,356	44,559	44,376
Source										
Albania: INSTAT (2018) Statistical Yearbook 2018, Institute of Statistics, Government of the Republic of Albania, http://www.instat.gov.al/media/4966/statistical-yearbook-2018-dt-21112018-i-fundit.pdf Kosovo*: MAFRD (2013) Kosovo* National Inventory 2012, Government of the Republic of Kosovo*, Pristina Montenegro: http://monstat.org/userfiles/file/publikacije/godisnjak%202018/12.sumarstvo.pdf North Macedonia: State Statistical Office (2015) Forestry 2014, agriculture statistics review, Government of the Republic of North Macedonia, http://www.stat.gov.mk										

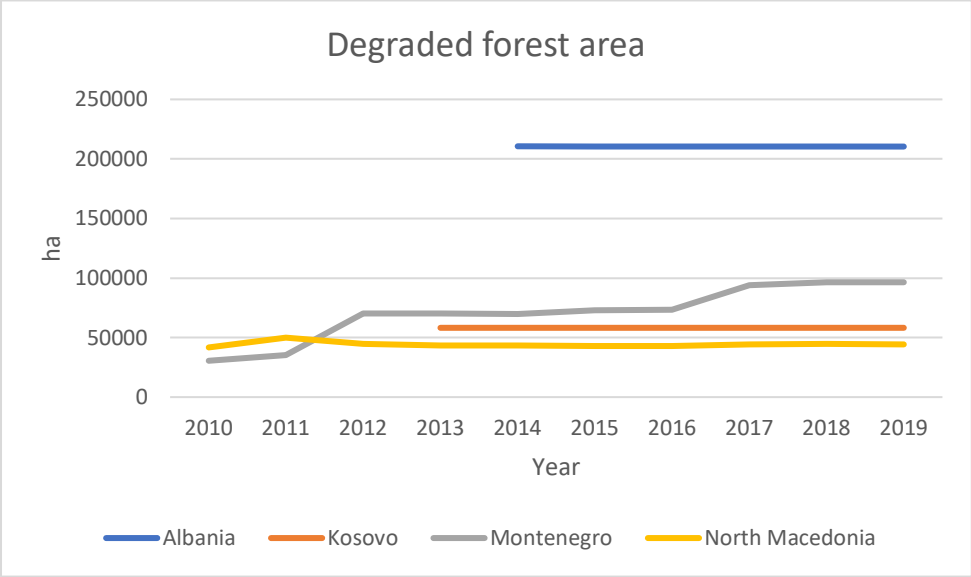
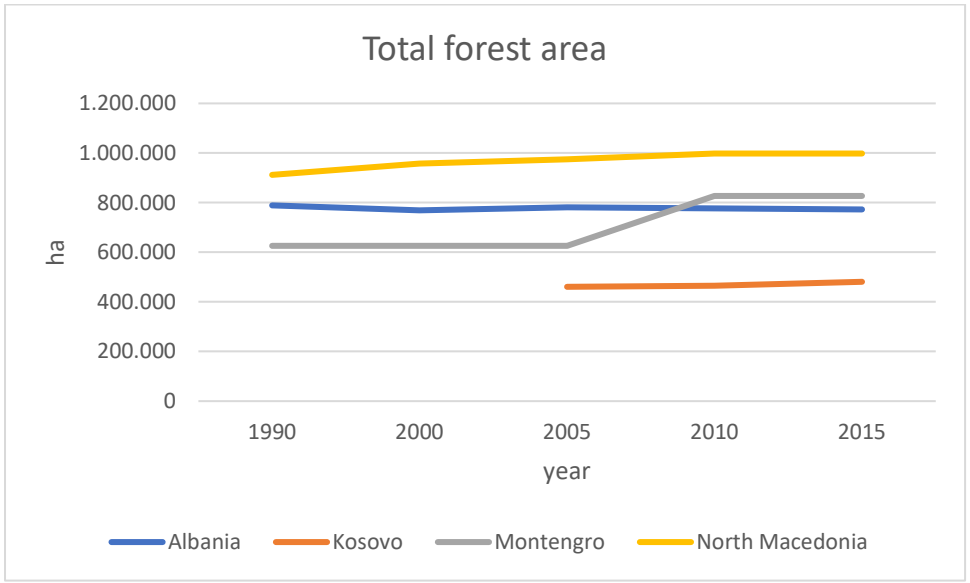


Table 21 Forest areas trend

Forest area trend (ha)						
Region	1990	2000	2005	2010	2015	**Sources**
Albania	789,000	769,000	782,000	776,000	772,000	1. http://www.fao.org/3/a-i4808e.pdf
Kosovo*			460,800	465,000	481,000	1. http://www.fao.org/3/a-i4808e.pdf
Montenegro	626,000	626,000	626,000	827,000	827,000	1. http://www.fao.org/3/a-i4808e.pdf
North Macedonia	912,000	958,000	975,000	998,000	998,000	MINISTRY OF AGRICULTURE, FORESTRY AND RURAL DEVELOPMENT: National forest inventory


Total forest area
1.200.000
1.000.000
800.000
600.000
400.000
200.000
0
ha
1990
2000
2005
2010
2015
year
Albania
Kosovo
Montengro
North Macedonia

Annex 1 Wood biomass related issues

During the first phase the participating stakeholders defined wood biomass related issues. These are presented in the table below.

Table: Issues related to wood biomass in the Drin riparian (1=low, 3=high)

Source: 6th Drin Stakeholders Conference (November 2018, Ohrid, North Macedonia).

	Use of fuelwood in households	**Environmental impact of fuelwood**	**Sophistication of biomass value chain**	**Priority of forestry in national development plans**
Albania	3	3	2	1
Kosovo*	3	3	1	1
Macedonia	3	3	1	1
Montenegro	3	2	2	3

Annex 3 Policy documents

Theme	Name of policy / strategic document	Year of preparation (where available)
Horizontal	**Albania**	
	National Strategy for European Integration 2016-2020	
	North Macedonia	
	The Accession Partnership, Council Decision of 18 February 2008 (2008/212/EC) on the principles, priorities and conditions contained in the Accession Partnership with the former Yugoslav Republic of Macedonia and repealing Decision 2006/57/EC.	

Environment and sustainable development	**Albania**	
	Intersectoral Draft Strategy of Environment 2015-2020	2015
	Annual National program on environmental monitoring	2015
	Forest Policy of Albania	2018
	Forest Law no 57/2020	2020
	Kosovo*	
	Strategy of Environment (2005-2015)	
	North Macedonia	
	Strategy for Sustainable Development of Forestry in The Republic of Macedonia	2006
	National Strategy for Sustainable Development 2009-2030	2010
	Second National Environmental Action Plan (NEAP 2)	
	Rural Development Programme 2014-2020, EU IPA	2014
	National Strategy for Environmental Investment (2009-2013)	
	Plan for Institutional Development of National and Local Environmental Management Capacity 2009-2014	2009
	National Strategy for Harmonization in the Field of Environment	2008
	The MEPP Strategic Plan for the period 2016-2018	
	The National Programme for Adoption of the Acquis - (NPAA) revised for 2017 – 2019	
	Montenegro	
	National Strategy for Sustainable Development by 2030	2016

	National Forest Policy of Montenegro	2008
	Forest law, no 77/2010	2010
	National forestry strategy, with forest and forestry development plan 2014 – 2023	2014
Energy	**Albania**	
	National Energy Strategy	2003
	North Macedonia	
	Law on Energy, No. 07-610/12, The Government of the Republic of North Macedonia	2011
	Strategy for Energy Development in the Republic of Macedonia until 2030	2010
	Montenegro	
	National Renewable Energy Action Plan to 2020	2009
Climate	**Albania**	
	Climate Change Strategy	2017
	National Action Plan on Climate Change	
	National Adaptation Plan	Since 2015
	Montenegro	
	National Strategy with Action Plan for transposition, implementation and enforcement of the EU acquis on Environment and Climate Change by 2020	2016
	North Macedonia	
	Third Action Plan on Climate Change	2014
	Third national communication on climate change	2013
	Kosovo*	
	Climate Change Framework Strategy	2014