How unsustainable Forest Management can have broad impacts on economy and society, by affecting local hidrology, land use, energy use and ecosystems and the natural capital overall.

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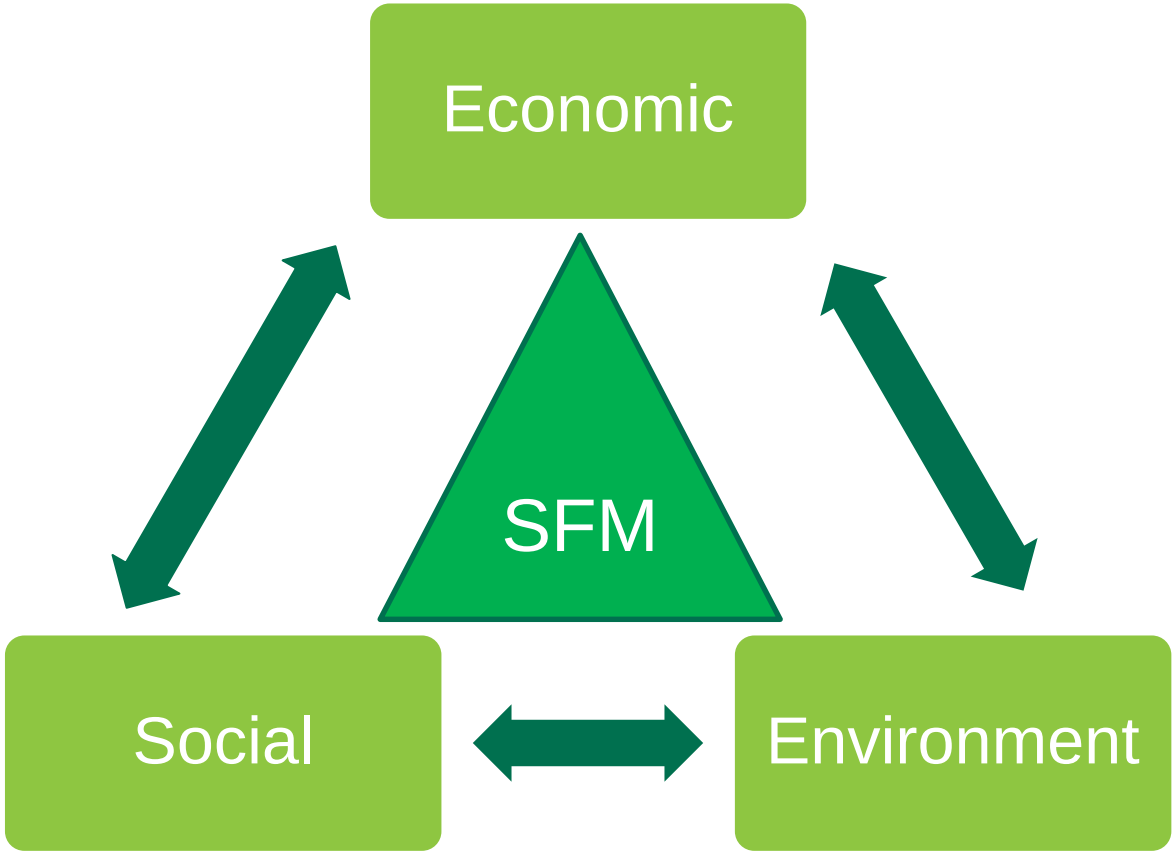
Main issues :

1. Introduction to Sustainable Forest Management/ why unsustainability?
1. Overview on Drini Basin
2. Main Problems in regard to Drini basin
3. Impacts on economy and society, affecting local hydrology

1. Introduction to concept of Sustainable Forest Management / Unsustainability ?

- **Sustainable forest management** (SFM) is the management of forests according to the principles of sustainable development.

- **SFM** has to keep the balance between three main pillars: ecological, economic and socio-cultural.


Economic
SFM
Social
Environment

1. Introduction to Sustainable Forest Management / Unsustainability ?

- Successfully achieving SFM will provide integrated benefits to all,
- ranging from safeguarding local livelihoods to protecting biodiversity and ecosystems provided by forests, reducing rural poverty and mitigating some of the effects of climate change.

Importance of SFM

- Forests play important roles in maintaining and balancing the natural ecosystem.
- The role of forest cover in hydrological and carbon cycles in the atmosphere

What is unsustainability?

- **Unsustainability:** causing damage to the environment by using more of something than can be replaced naturally:

  *(Definition of **unsustainable** from the **Cambrige Business English Dictionary***

- The high rates of deforestation in recent years however have become concerned for all governments all over the world.
- *Not respecting the principles of SFM*

- *Annual Cutting of forest > Annual Forest Growth, where in Albania it was 2-3 times more cutting than forest growth*

2. Overview on Drini Basin

- The Drin Basin is located in the Western Balkans and it is shared between Albania, Kosovo, Macedonia and Montenegro.

Image: Rivers and Lakes part of the Drini basin

2.Overview on Drini Basin

- **Drini basin** is the **biggest basin** in Albania, covering a quarter of the country's surface and discharging half of the country's water quantity into the Adriatic and Ionian seas.
- The total surface of this basin is **5,973 km²**.
- Collects the waters of a **surface of 19.582 km²**:
- **14.173 km² belongs to the Drini** watershed and the rest to the Shkodra lake watershed.

Main problems

- The damage of river bed in some parts as the result of the natural deviation and human intervention
- High erosion in the basin, as the result of the topography and deforestation.
- Some human activities have increased the risk of flooding. This includes extracting gravel from rivers and deforestation in mountainous areas.

Main activities identified on Drini basin

- **Main activities :** Agriculture & livestock , Forestry & Pasture, Industry – mining , Fishery , Tourism &ecotourism.
- **Hydro-energy** – The cascade of Drini river produce 93% of the total hydroenergy in Albania with the power installed of 1,350 MW
  • Fierza; • Koman; • Vau i Dejes.
- Ashta hydropower with 48.2 Mw
- An new hydro-power plants planned to be constructed : In Skavica (Diber) with an installed power of 350 MW

3. Unsustainable forest management/ Land Degradation

- Land degradation has been identified as a major issue, mainly due to uncontrolled grazing and illegal logging
- Most of natural resources are under threat of pressures such as:
- illegal logging, hunting, fishing,
- soil erosion and degradation, fires,
- poor water management and construction of hydropower plants (HPPs),
- environmental pollution,

3. Unsustainable forestry management and deforestation

- Poor management practices (e.g. intensive timber production and firewood,
- Forest cutting the 2-3 times more than Allowable annual forest cut
- Over-harvesting of rare medicinal plants, with only limited attention to ecosystem management) have led to direct impacts on biodiversity depending in woodland habitats and increased erosion.

3. Unsustainable forestry management and deforestation

- More severe damages in the Lura National Park and Luzni-Bullaci Reserve.
- Habitat fragmentation and loss is an issue across the drainage basin.
- The Diber, Kukes, Puke and Malesia e Madhe Regions in the Drin watershed host the largest areas of forest in Albania and they play a critical role in flow regulation and prevention of erosion.

3. Inappropiate practices on agricultural areas

- Inappropriate management practices on the agricultural lands, like intensive plowing, cultivation on long hill slopes without terraces,
- Leaving the soil surface bare for long time between the growing seasons.
- Mismanagement of soil cultivation is an increase of soil erosion

Land Degradation

Degradation can be stopped through grazing control and avoid human negative impact

Land Degradation

- **Poverty** is concentrated in rural areas, in particular in hilly and mountainous areas, which account up to 70% of the poor, and in the north-east of the country (essp.Drini Basin).
- Poverty in Albania is 14 %.
- Dibra and Kukesi region - the **poorest area** in Albania
- There are also **strong links between poverty** and **environmental degradation**, which affect the erosion

Soil erosion

- causing land degradation,
- Increasing the flooding;
- Filling of reservoirs with soil and sediments
- Shortening the life of HPPs
- Water reduction infiltrating in the ground.
- Forest fires etc.

Figure: Degradation of forest areas by overgrazing and forest cutting

Erosion data in Albania

- Results show that natural soils:

  - **disposed to erosion** is about 24 % of the territory,

  - **less disposed to erosion** phenomenon is 59 % of the territory;

  - **not disposed to erosion** is 17 % of the territory.

Erosion in Albania

Not or slightly susceptible to erosion
Moderately susceptible to erosion
Highly susceptible to erosion
Extremely highly susceptible to erosion

20-70 ton/ha/year (World Bank, 2007)

14-50 times higher than the annual rate of soil formation in Europe

Source: *FRI (2004). Evaluation of erosion risk evaluation in Albania*.

Erosion and Sedimentation

- Erosion is an important issue in the Drin River Basin, which contributes significantly to increased flood risk.
- Among the causes of erosion and sedimentation are:

  - over-grazing,

  - logging, forest fires, unsustainable agricultural practices including inappropriate irrigation methods and agriculture in steep slopes, changes in flow regimes (e.g. due to dams, see below) and gravel extraction along the rivers.
- The changes of the shape of the river channel undermine infrastructure, bridges and roads, and productive land.

Effects of Forest Fires

- Negative effects on desertification.
- key role in changing of the land use, shaping ecosystems – pioneer species
- destroying wildlife habitat
- polluting the air with harmful emissions.

Effects of forest fires in shaping ecosystems

Illegal logging in Protected areas

- Illegal logging in National Park, like Lura National Park
- Change of the form of use, from the forest to the bare land, where they are part of the erosion phenomena.

Interventions in Lura National Park (Diber)

Forest role in reducing land loss

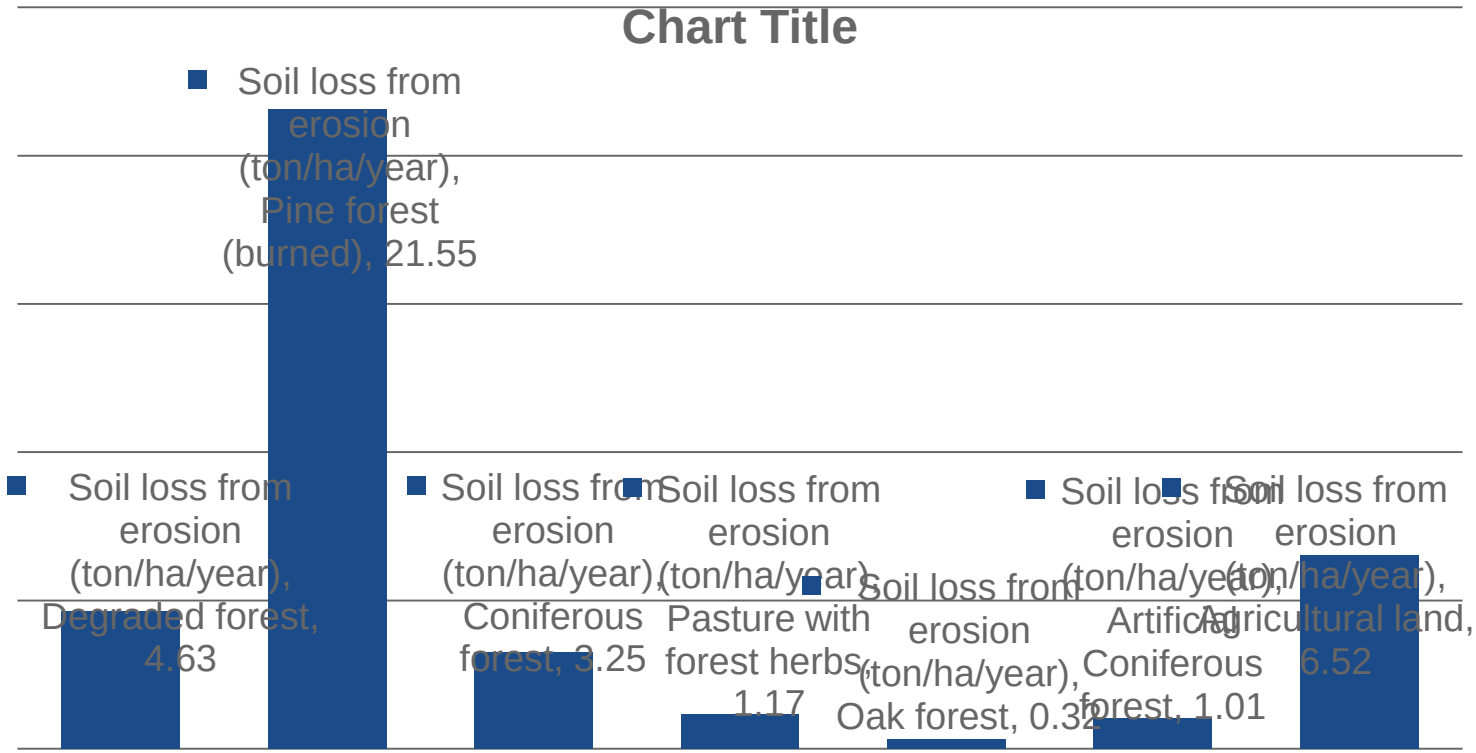


Figure: Measuring erosion in Bovilla Basin (Tirana), 2017.

Impacts on Economy of the Drini basin

- The Hydropower dams in the Drin basin and their reservoirs are of **great importance to the economy**.
- They are **the main sources of electricity** in Albania.
- Albania’s internal electricity generation capacity of about **2,100 megawatt** (MW) is entirely dependent on hydropower.

- Three power plants in the Drin River cascade: Fierza, Komani and Vau Dejes with total installed capacity **1,350 MW**, generating about **70 percent of total supply**.

Impacts on Economy of the Drini basin

- In an average hydrological year, the Drin Cascade generates about **4 billion kilowatt hours** of hydroelectricity.
- Extension of the **operating life of the three HPPs** along the Drin cascade is not only a safety concern, but also a potential revenue management source for the Government in the future.
- The Drin Basin **is important to the economy of countries** sharing it where the main users of water are **agriculture, energy, water supply and sanitation, mining and industry, environment, fisheries, tourism, and transport.**

Impacts on society

- The Drin River Basin (DRB) is a transboundary river basin, which is home to 1.6 Million people and extends across Albania (**30% of basin area**, 27% of total country area, **37% of basin population**).
- About **570 000 inhabitants** live within the Drini watershed in Albania in 80 communes/LoGU and 11 municipalities.
- In the Drin-Buna water basin it is estimated that in a flood once in 100 years, about 20,000 buildings and 170,000 inhabitants were affected.

Erosion effects

- Erosion is one of the main problems with many negative consequences:
- - loss of the topsoil which is the most fertile.
- - filling with sediments of reservoirs and basins of hydropower plants
- - accumulation of sediments in irrigation canals and flooding of low areas.
- - decrease of water quality and endangerment of aquatic fauna.

Overgrazing

- ***Over grazing***. Erosion is intensified from over grazing in more than 40% of woodland area. Over grazing is a factor, which indirectly influences in the level of erosion,
- Uncontrolled grazing coupled with poor forest management, has resulted in the deterioration of forests in most parts of the Drin Basin including.
- Number of goats and sheep for one hectare of forest (woodland) is 2.85, which is greater than the average of the Mediterranean Region,

Importance on Ecosystems

- The **Lake Prespa** sub-basin comprises the two lakes of Small Prespa and Prespa that are linked together through a channel.
- Important for water birds, colony of Dalmatian pelicans in the world and they are also part of Ramsar List of Wetlands of International Importance.
- **Shkodra Lake**, a Ramsar site, is the largest lake in the Balkan Peninsula
- It is one of the largest bird reserves in Europe, having 270 bird species, among which are some of the last pelicans in Europe
- **Lake Ohrid** is the deepest lake of the Balkans,
- The lake preserves a unique aquatic ecosystem with more than 200 endemic species.
- In 1979 it was declared a World Heritage site by UNESCO.

Land use

In Albania: Forests accounts for 28.78 %, shrubs and open spaces for 45.59 % and arable land accounts for 17.19 % of the area of the Drin basin within Albania

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%
FYR 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*

Energy use

- Hydropower Plant (HPP) “Fierza” HPP “Koman” and HPP “Vau i Dejës” with a total in-stalled capacity of 1350 MW.
- “Ashta” hydropower plant on Drin river with an installed capacity of 48.2 MW.
- There are currently 22 small Hydro-power Plants (SHPPs) in operation.
- The dams have changed the hydrological, hydraulic and sediment regime of the river considerably

Hydrology use

- Due to the retained volume of the dams the overall hydrological regime changed for low flow and small flood events (1-10 years).
- Small flood events are particularly important to maintain the dynamic braided river zones and its specifically adapted flora and fauna.
- Due to the retention volume it is estimated that floods of about 5,000 m^3/s can be reduced to about 2,000 m^3/s downstream of the last dam (if the dams are not filled with water).

Rainfall

- Seasonal nature of rainfall
- Driest period: June, July and August as the driest months;
- Most important period for the growth of agricultural crops

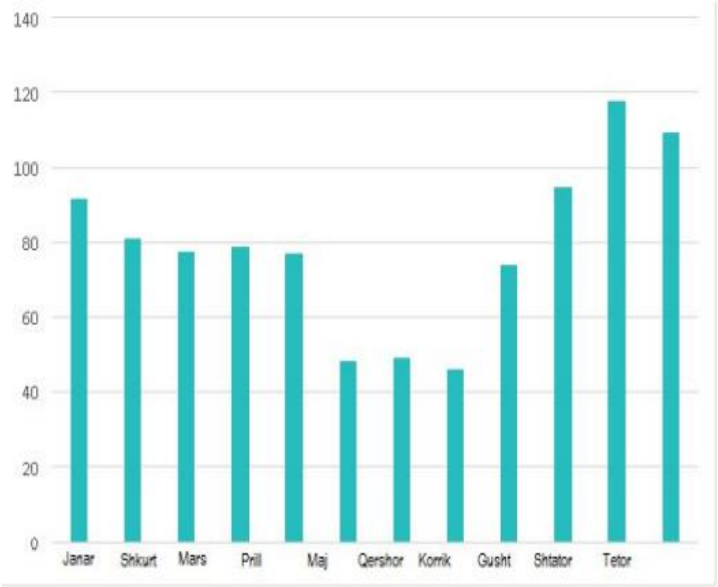
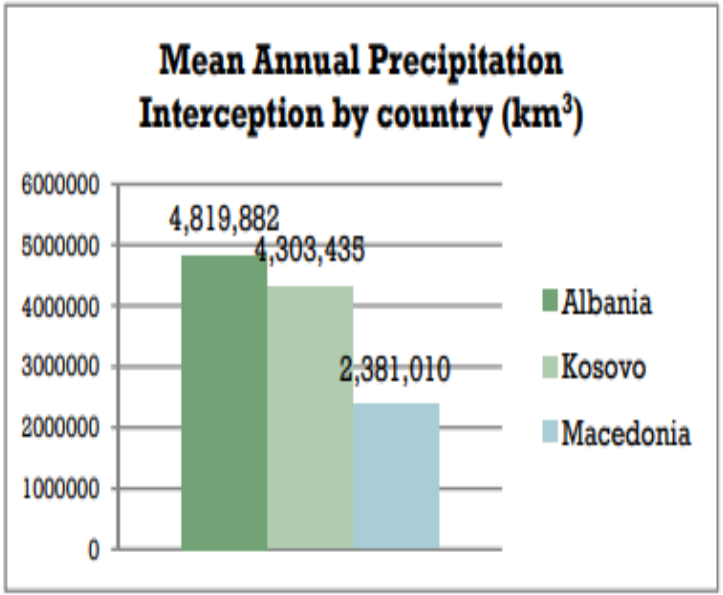
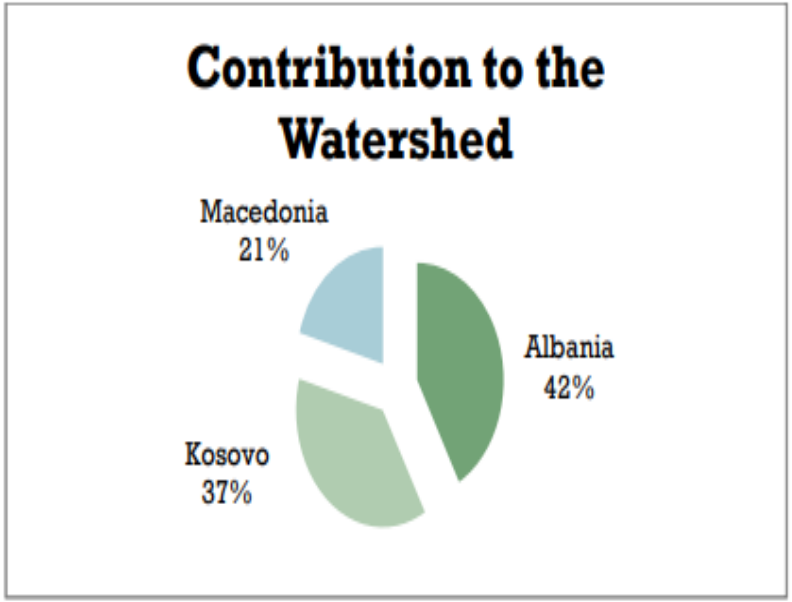


Figure: Average annual rainfall in Kukes region on Drini basin

Contribution to water balance of Drini basin





Effects on habitats and ecosystems of the Drini basin

- Changes in the flow regime both upstream and downstream of the dams affects the habitats in the Black Drin River and changes in the erosion patterns in the river bed and banks.
- Hydropower production is also linked to oscillations of the water level in the lakes Ohrid and Shkoder, that impacts their ecological, economic and cultural/ recreational value.

Effects on habitats and ecosystems of the Drini basin

- Permanent decrease or significant oscillations in the water level may lead to the shift of littoral zone habitats and/or
- Deterioration or even elimination of the wetlands hence, deterioration of biodiversity.
- Commercial fishing will also be negatively affected since these habitats provide the spawning grounds for four commercial species,

Climate changes

- Dams, by their very nature, create risks, which may increase substantially under climate change.
- Poor maintenance could lead to reservoir sedimentation which would reduce flood storage and change channel morphology and can thus exacerbate flooding.
- Poor maintenance or catastrophic hydro-meteorological events will increase with climate change

Thanks for Your Attention!