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SUSTAINABLE LAND MANAGEMENT IN THE LIM RIVER BASIN

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1.0. THE MAIN CHARACTERISTICS OF THE LIM RIVER BASIN

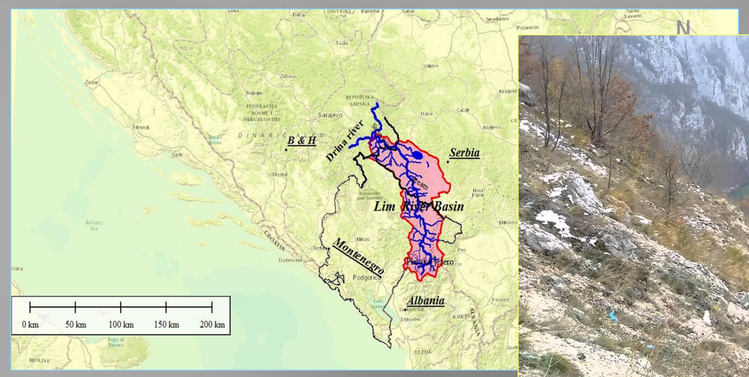
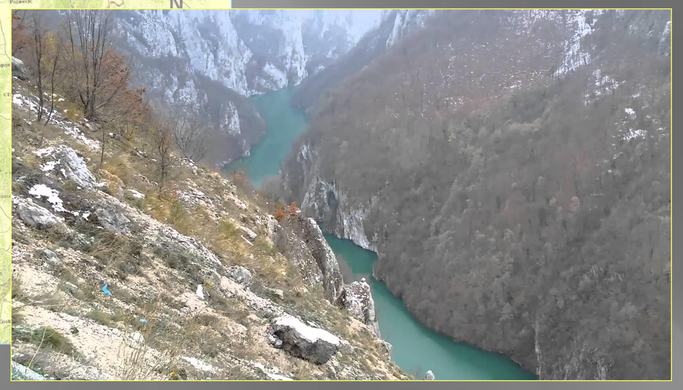


Figure 1 – The Lim River Basin



The Lim River is raised in Plav lake in Montenegro and in the length of 220 km flows through Montenegro Serbia and B&H until the Drina River. The Lim River Basin is extending on the total area of 5,963 km^2. The Drina River which is a natural border between Serbia, Montenegro and Bosnia & Herzegovina represents the most important water resources in the Western Balkans. The Lim River is the biggest tributary of the upper part of the Drina River which significantly influences its water regime.

2.0. NATURAL AND ANTHROPOGENIC FACTORS TO LAND DEGRADATION

In the cross-border belt between Serbia and Montenegro are located more than one hundred torrential water flows that belong to the Lim River Basin. Under extreme climate events they turned into floods of destructive power and great energy causing enormous damage on the environment and socio-economic development.

The average annual rainfall for the period 1990-2015 in the upper course is recorded from *847 to 1123 mm* while in the lower course is *700-940 mm. The average perennial water discharge rate* of the Lim River in the upstream at the measuring points in Montenegro is ranged from *19.3 - 65.4 m^3/s (average runoff 29.9 - 53.0 l/sec per km^2)* and in the downstream is ranged from *72.1 – 95.8 m^3/s (average runoff 25-26.0 l / s per km^2)*. Water discharge rates are very uneven in a real time and characterized by large amplitudes between small and large waters and the phenomenon of successive events of drought periods and great waters referring to the torrential character of the Lim River and its tributaries.

The anthropogenic factors including sudden and unplanned urban development, deforestation on steep slopes and logging for the needs of the wood industry, frequent fires of forest and pasture areas, inadequate tillage practice of land on the slopes influence the land instability, erosion of river beds and loss of topsoil.

3. SOIL EROSION

Given the natural and anthropogenic factor, the whole area is affected by pluvial and fluvial erosion of various types and intensity. Terrain on the slopes over 5% is affected by intensive degree of erosion, while strong to medium degree covers 70% of the area. On the terrain that is built on the diabase–chert formation is registered a large number of both, active and passive landslides.

In the Lim River Basin were built hydro-energetic systems and accumulations of 'Bistrica' (105 MW), 'Uvac' (36 MW) , 'Potpec' (54 MW) and 'Kokin Brod' (21 MW) which may to a certain extent successfully regulate the water regime downstream and to reduce the negative impact on the processes of water erosion. However, siltation of accumulation reduces their useful volume and threatens the basic functions (water reservoirs), especially those for water supply, irrigation and energy production in particular is affected HPP 'Potpeć' that has lost a significant part of the usable volume due to accumulated sediments.

Figure 2- Hydro-energetic systems and accumulations 'Potpec'

Observed period	Accumulation volume 10^6 m^3	Reduced volume 10^6 m^3	Average annual siltation m^3 /year
1967	42.9		
1976	34.9	8.0	890.000
1981	31.9	3.0	600.000
1991	27.9	4.0	400.000
1999	25.1	2.8	350.000

Table 1 - Recorded results of 'Potpec' accumulation volume

Accumulation 'Potpec' is 22 km long and its width ranges from 100 to 300 m. After the construction in 1967, its volume was 42.9 x106 m3. After 35 years of exploitation, the total volume was reduced by 43.1% (from 42.9 to 24.4 x 106 m3). It is estimated that 350 m3 / km2 / year of sediment (1,26 x106 m3) from the Lim River Basin reaches in the 'Potpec' accumulation.

4.0. SUSTAINABLE LAND MANAGEMENT POLICIES AND PRACTICIES

The situation in the Lim River Basin imposes the sustainable land management policies and practices (SLM) while respecting the needs of local people and the communities in the cross-border region.

The following operational objectives are identified to improve the actual water management of the Lim River catchment :

1. Establishing a legal framework and improving conditions for the protection from erosion and torrents management ;
2. Monitoring and maintenance of works;
3. Strengthening the cross-border cooperation and partnership between the local population and governments.

Proposed measures include technical anti-erosion works with special attnetion to biological measures. Biological measures include afforestation, rehabilitation of degraded forests and pastures, landscape management contributing to the stability of degraded lands and maintenance of the ecosystem service function. Activities also include the development of cadastre of erosion processes in the Lim River basin and its continuous update; cross border data exchange leading to joint monitoring of trends and provide basis for the efficient integrated water management in the Lim River Basin; awareness raising and education of the local population about the SLM practices and measures.