



SETOF

Soil Erosion and TOrrential Flood
Prevention: Curriculum Development at the
Universities of Western Balkan Countries

PRESENTATION OF THE ANALYSIS OF SOIL DEGRADATION/SOIL EROSION STATE AND TORRENTIAL FLOODS IN THE REPUBLIC OF SRPSKA

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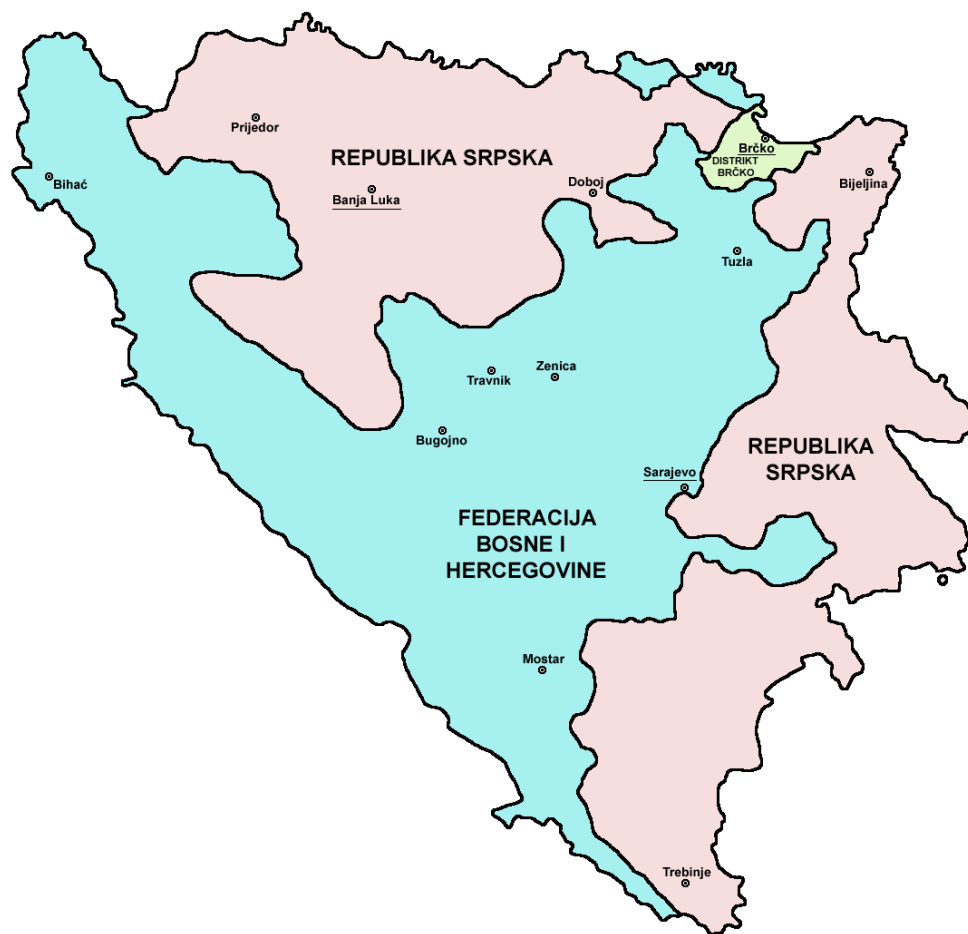
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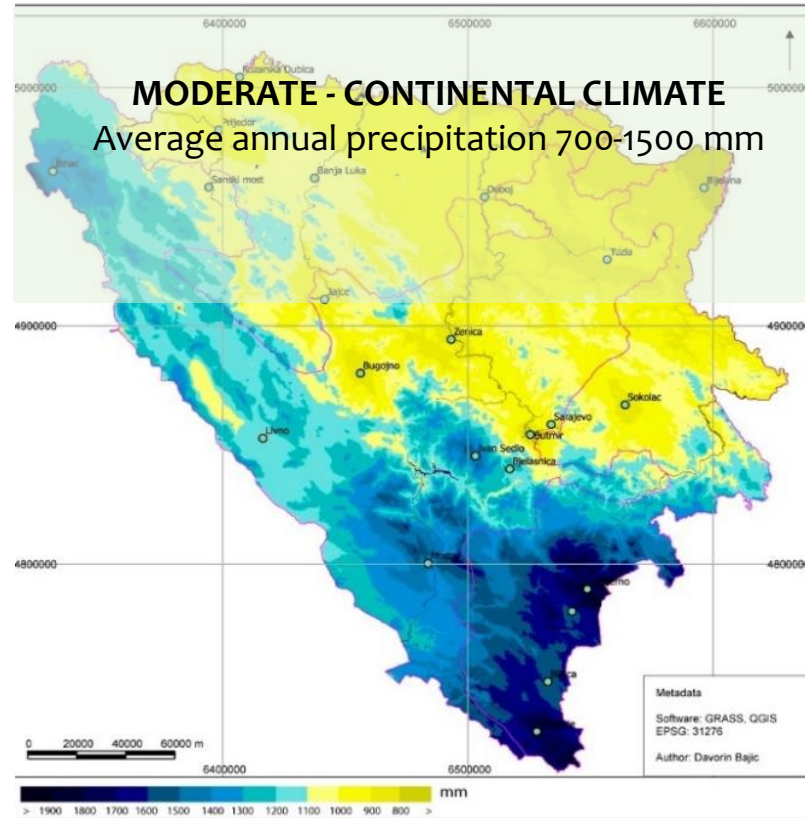
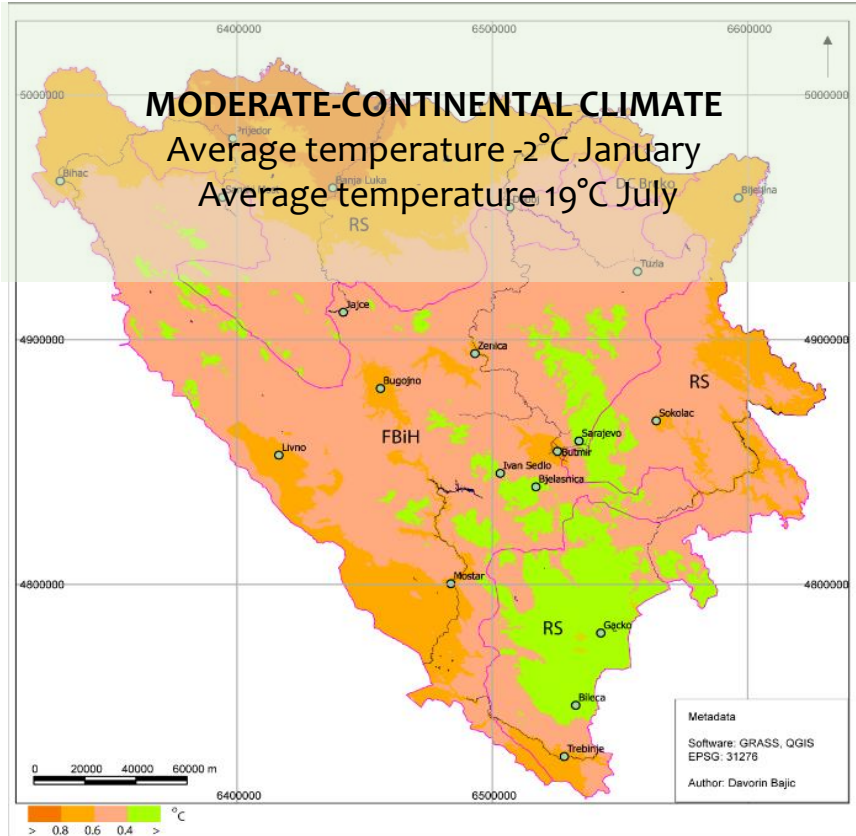
Land resources of the RS

- BOSNIA AND HERZEGOVINA - SOVEREIGN STATE WITH PARLIAMENTARY STATE REGULATION
- ENTITY THE REPUBLIC OF SRPSKA
- ENTITY FEDERATION OF BOSNIA AND HERZEGOVINA
- DISTRICT BRČKO
- DECENTRALIZED POLITICAL AND ADMINISTRATIVE STRUCTURE
- LAND AND LAND RESOURCES ARE UNDER JURISDICTION OF THE ENTITIES - REGULATED BY THE ENTITY LEGISLATION



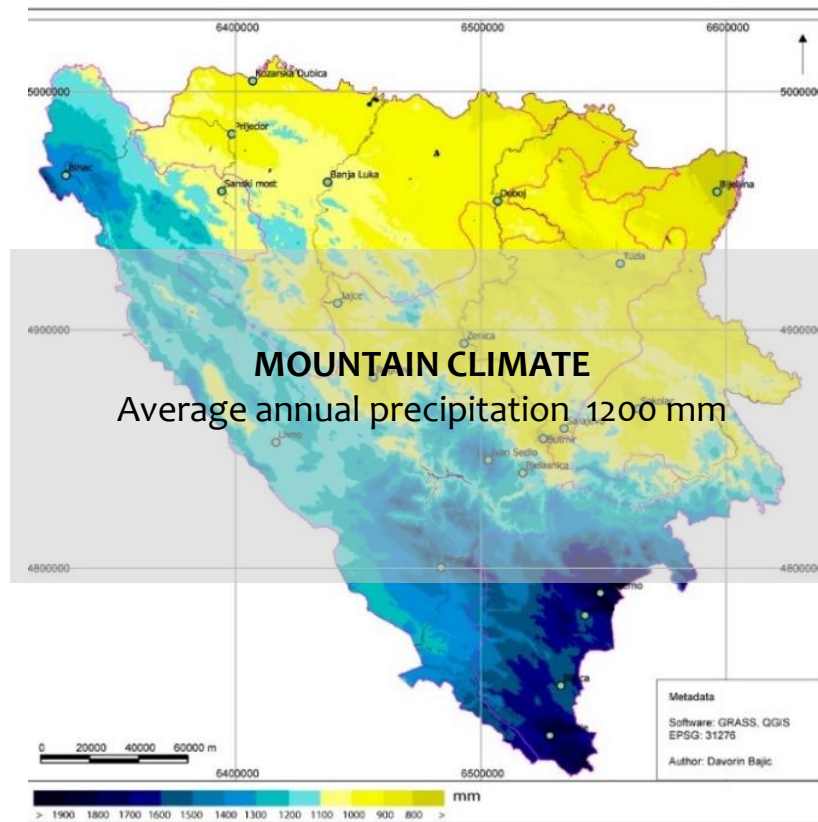
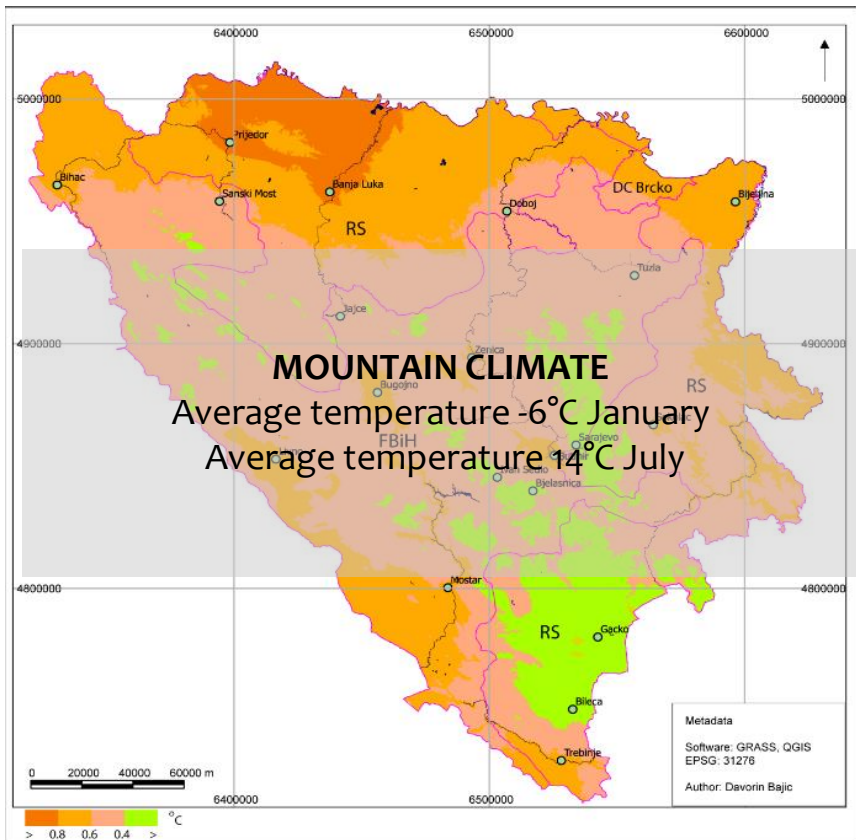


Climate characteristics



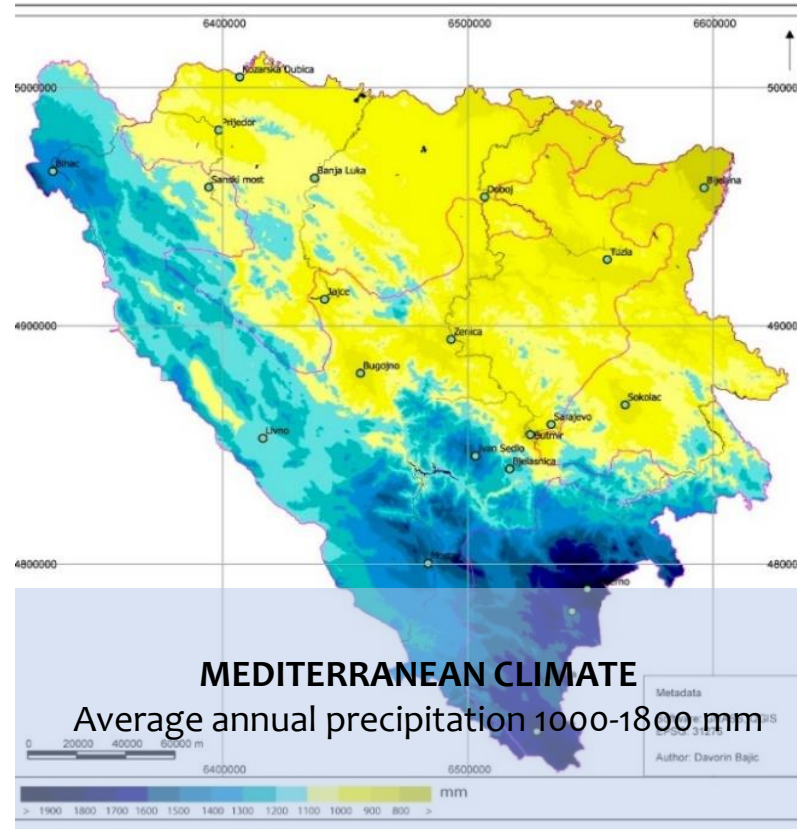
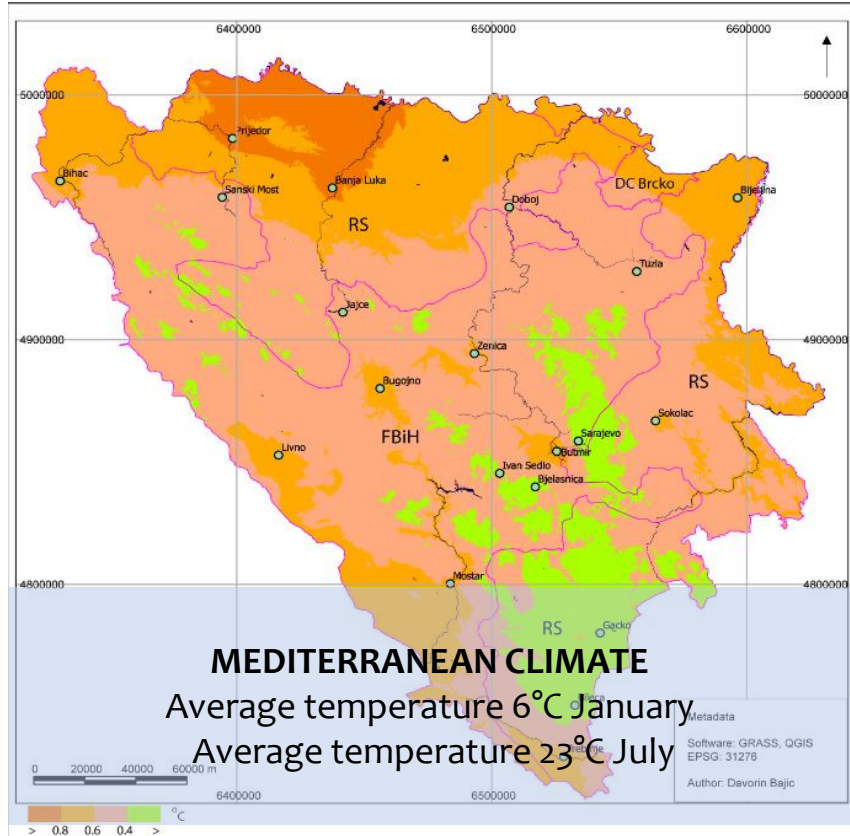


Climate characteristics





Climate characteristics





Natural characteristics

GEOMORPHOLOGY



VEGETATION



- Coniferous forests in the highlands,
- Mixed forests in the mid-altitudes, and
- Broadleaved forests in the low-level terrains and floodplains.

CCA 53% OF FORESTS AND FOREST LAND



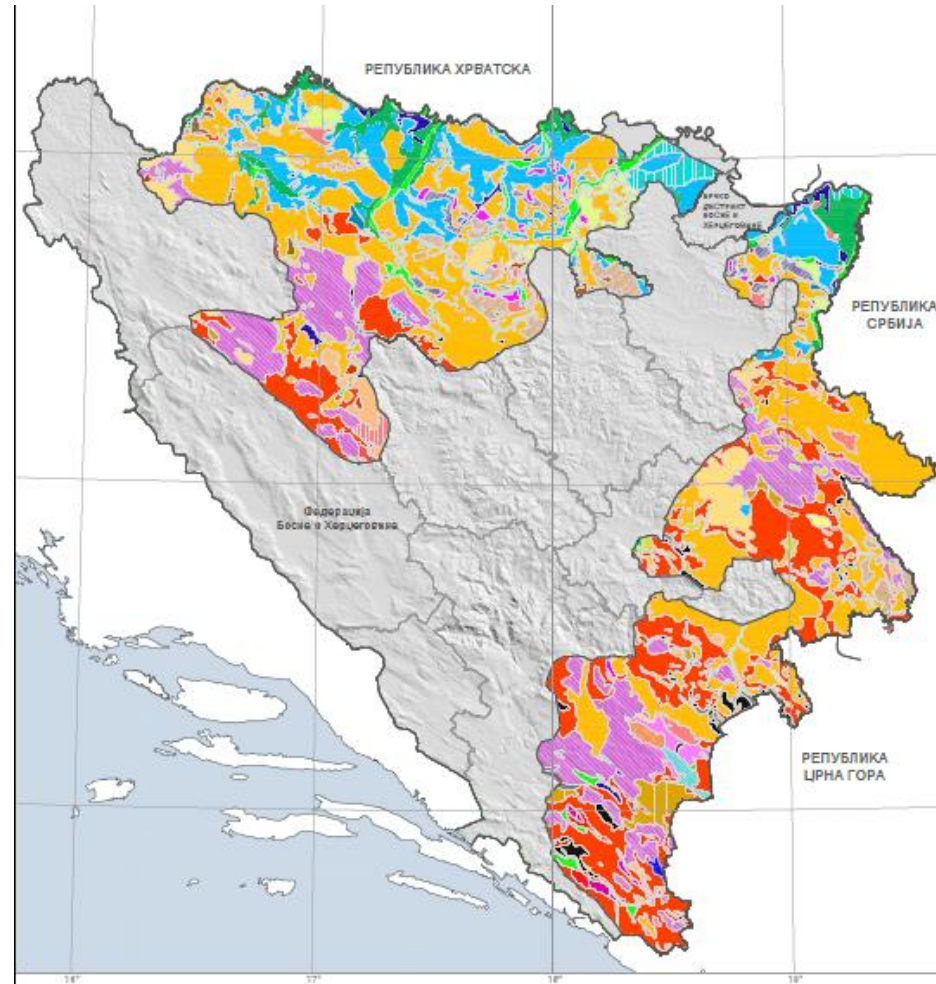


Land resources of the RS

Main soil types (according to WRB):

- Cambisols, dystric, eutric
- Cambisols on limestones and dolomites
- Leptosols, mollic, rendzic, dystric
- Luisols
- Pseudogley
- Fluvisol

The most fertile soils are located in the north, along the River Sava valley. Central part is covered mostly by forest soils, while south part is the most vulnerable one and belongs to Herzegovina.





Land resources of the RS

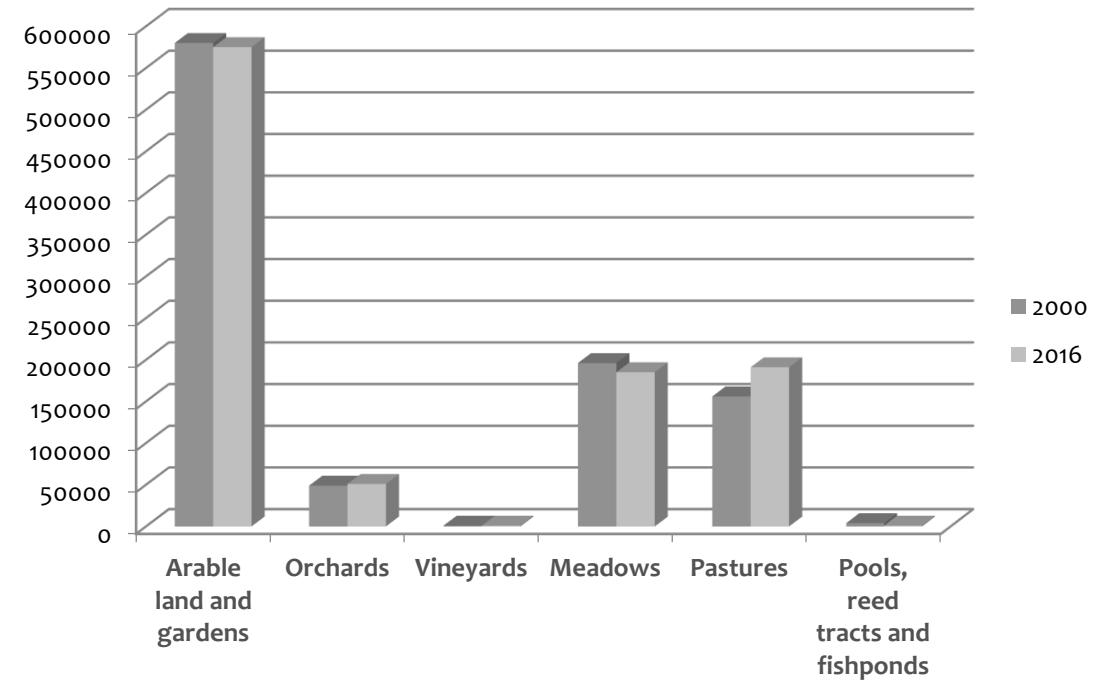
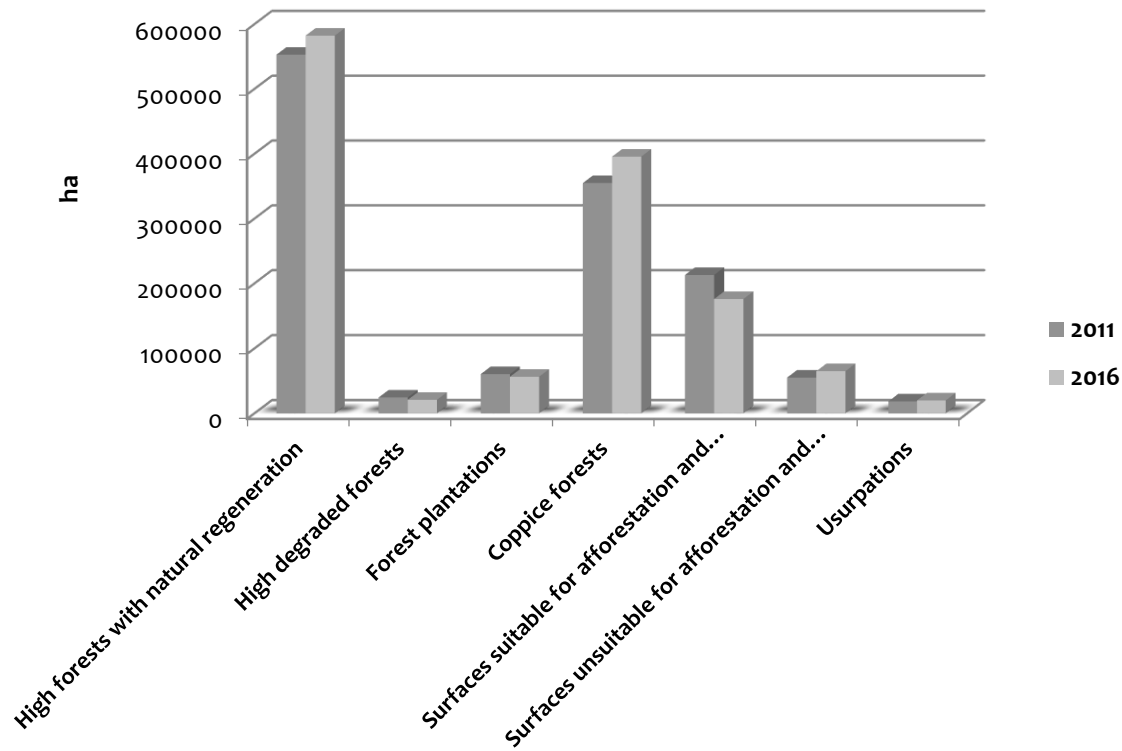
The main characteristics of soils are:

- Acid soils cover around one-third of the total land,
 - Humus content is low,
 - Content of the most important nutrients is low, especially in phosphorus,
 - Soils are mainly shallow (deep only at alluvial areas and in the north RS: Lijevo field, Posavina, Semberija),
 - Excess water on about 14% of the territory,
 - Inadequate care of soil fertility management and its improvement,
 - Water erosion is quite a present problem, particularly on sloping land.
-
- High quality soils account only approximately 15%, moderate quality approximately 22%, while the rest is classified as low quality (approximately 32%) and very low quality (approximately 30%) soils of the total RS land resources





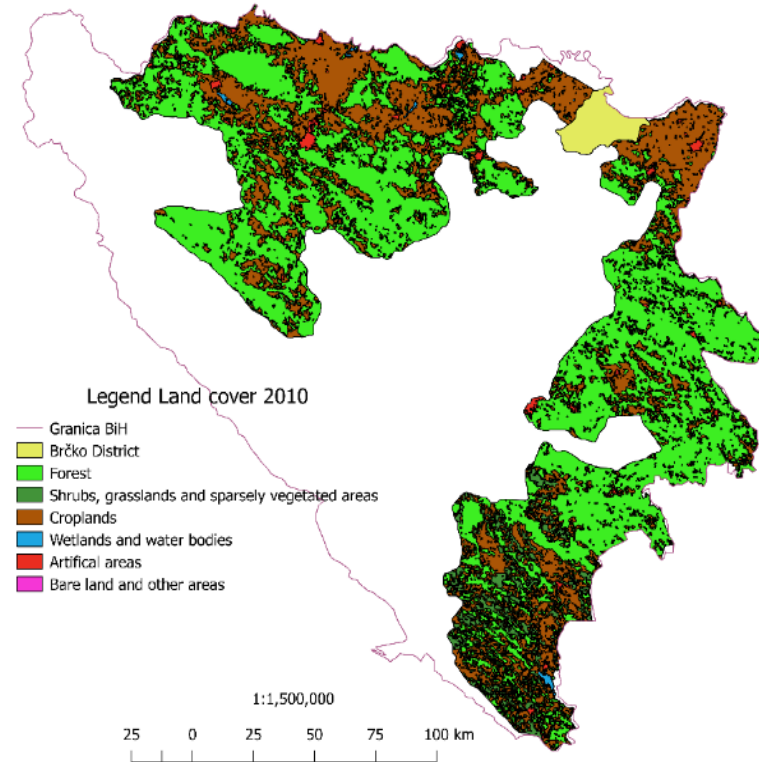
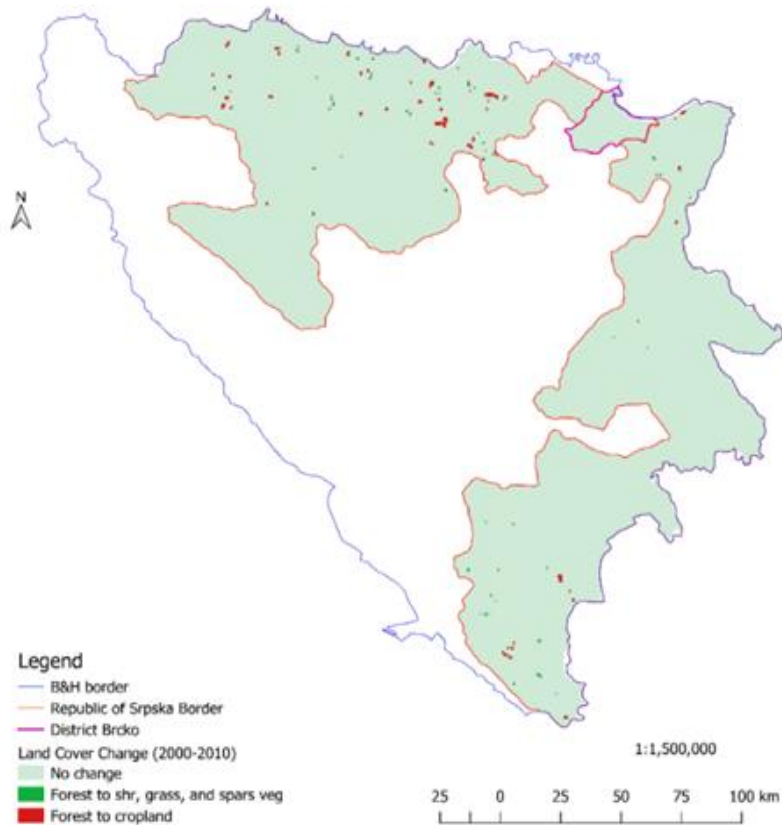
Structure of forest and agricultural land





Land cover change 2000-2010 (ESA)

- Decrease of forests
- Increase of shrubs
- Increase of cropland





Land cover change matrix for BiH 2000-2015 (BiH)

Year	Land cover (km ²)					
	Tree-covered areas	Grassland	Cropland	Wetland	Artificial surfaces	Other land
2000	28889	5994	15686	56	279	10
2001	29021	5995	15551	56	281	11
2002	28990	5997	15575	56	286	11
2003	29008	6000	15548	56	292	11
2004	28940	6009	15596	57	302	11
2005	28983	6005	15545	58	314	10
2006	29079	5992	15451	58	326	10
2007	29132	5990	15387	58	340	10
2008	29281	5998	15218	57	352	10
2009	29450	5975	15062	57	362	10
2010	29462	5971	15048	57	368	10
2011	29453	5970	15049	57	377	10
2012	29439	5972	15051	58	386	11
2013	29443	5968	15033	58	404	11
2014	29516	5935	14958	57	440	11
2015	29515	5933	14941	57	460	11
Net area change	626	-61	-745	1	181	1



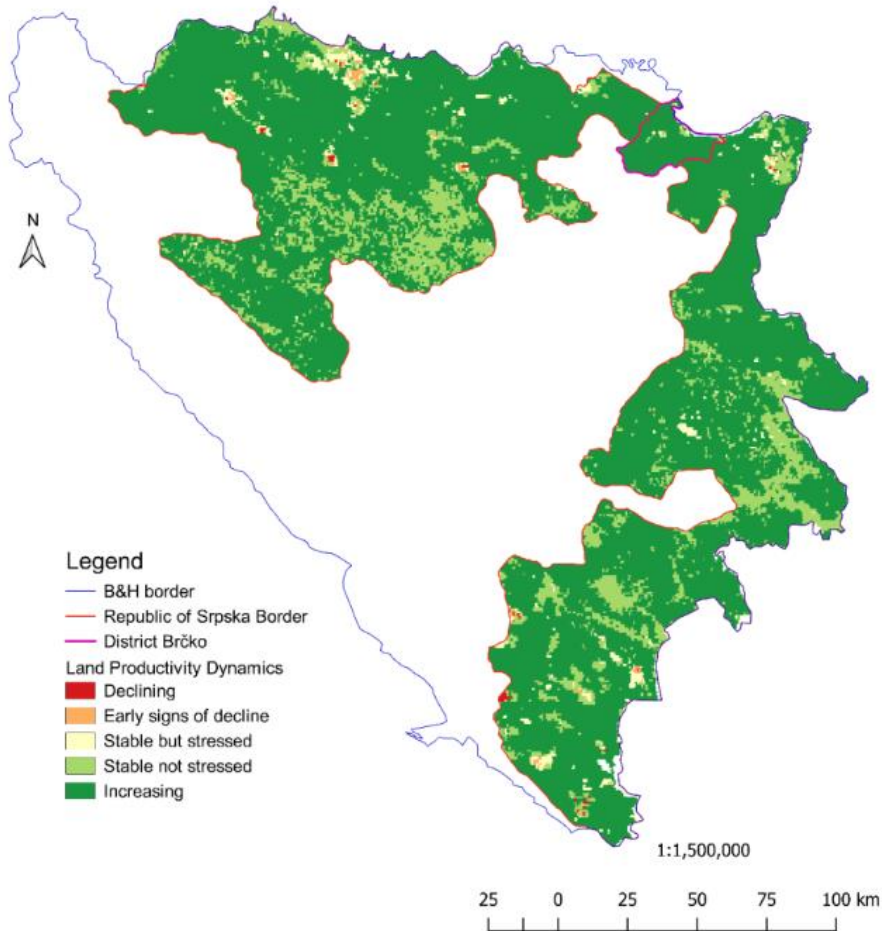


Land productivity dynamics (2000-2012)

DECREASED LP ON 2,54% OF TERRITORY

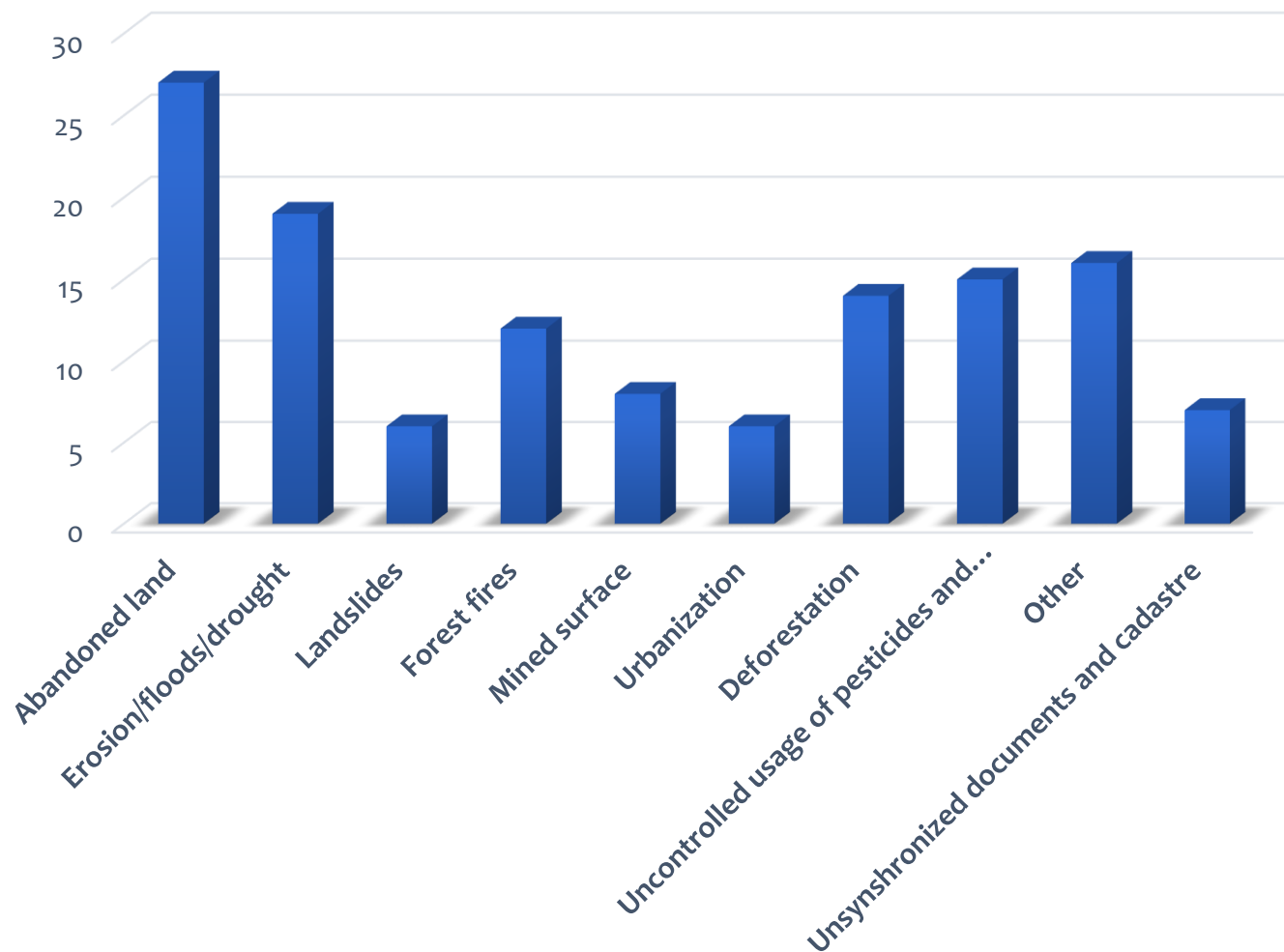
STABLE LAND PRODUCTIVITY ON 14,94%

INCREASED LP ON 82,11% OF THE NATIONAL TERRITORY





Main Land degradation drivers in the RS





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Land resources of the RS



ABANDONED AGRICULTURAL LAND



ABANDONED HOUSEHOLDS

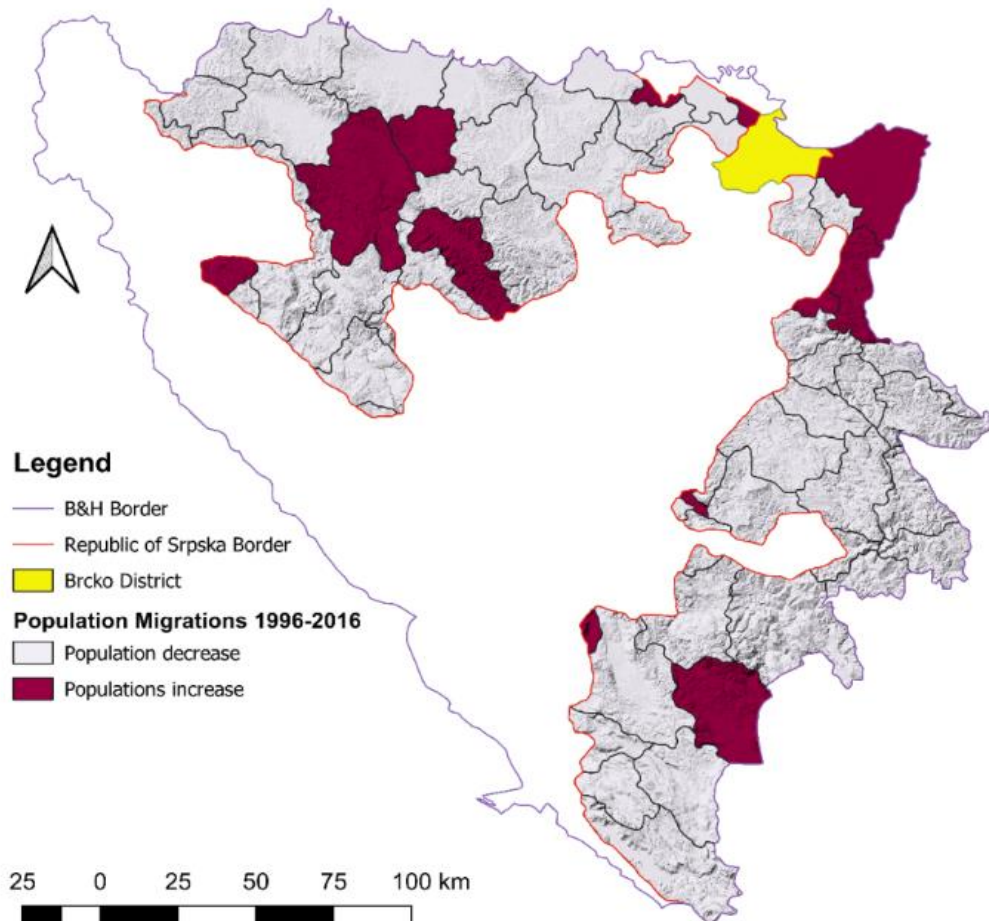
POPULATION DECREASE IN 75% OF LOCAL COMMUNITIES

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Land resources of the RS

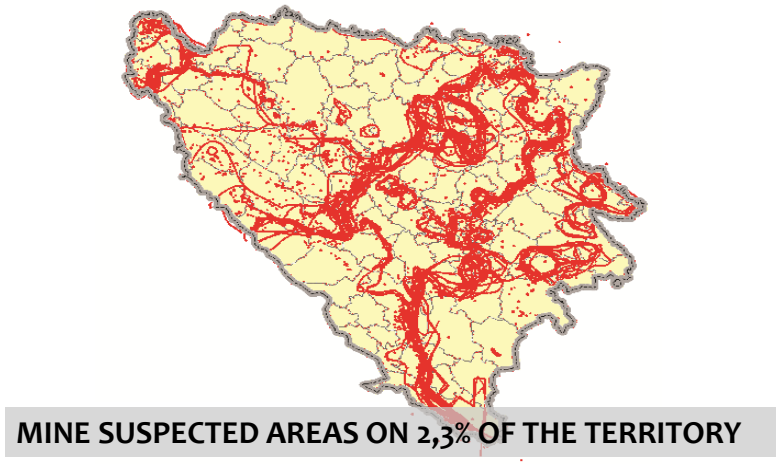


POPULATION CHANGE FOR THE PAST 25 YEARS





LD drivers





LD drivers



OVER-USE OF PESTICIDES/MIN.FERTILIZERS



MINING/CONTAMINATION



ILLEGAL DEFORESTATION



RIVER BANKS - MEANDERS





Floods and landslides

The main factors increasing the flooding risk:

- Heavy precipitations,
- Removal of forest cover upstream (illegal cutting),
- Uncontrolled urbanization,
- Road infrastructure on slopes,
- Reduced discharge capacity of regulated river sections,
- **935 torrents are registered in BIH (Dragović et al., 2018)**

Flood protection in the Republic of Srpska

- MAFWM
- Flood protection project for Sava and Drina rivers (channels),
- Action Plan for Sustainable Flood Risk Management in the Danube River Basin with applications on Sava sub river basin in RS 2010-2021, prepared by the International Commission for the Protection of the River Danube.
- Flood risk management plans (Vrbas river) by GEF/UNDP (estimation is 167 Mil USD for successful prevention and protection from floods only in Vrbas watershed).





Floods and landslides

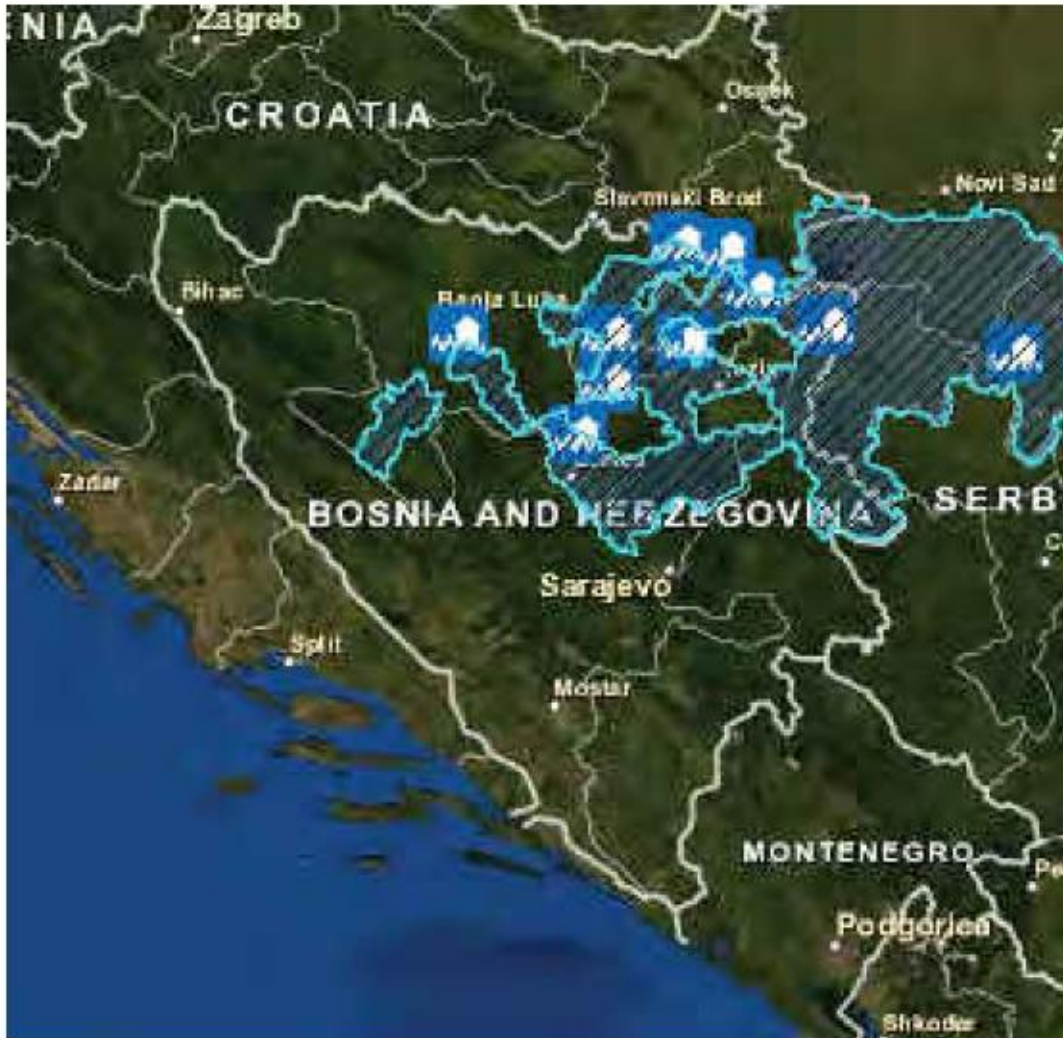
Table 2.15 Summary of major flood events in Bosnia and Herzegovina, 2010-2015 (Source: Flood Prevention and Management, Gap analysis and needs assessment in the context of implementing the EU Floods Directive, September 2015)

Date	Affected areas, municipalities	Extent of damage
Dec. 2010	River Drina catchment, Municipalities of Bosanska Krupa, Domaljevac - Šamac, Orašje, Tuzla, Maglaj, Goražde, Foča - Ustikolina, Pale - Prača, Ravno, Čitluk, Čapljina, Stolac, Mostar, Trnovo, Ilidža, Novi Grad, Tomislavgrad, Drvar, Trebinje, Bileća, Nevesinje, Foča, Novo Goražde, Bratunac, Zvornik, Bijeljina	<ul style="list-style-type: none">• 20,000 people affected, 5,000 houses flooded,• 6,000 people evacuated.
May 2014	Sava tributaries: Una, Sana, Vrbas, Vrbanja, Bosna and Drina and River Sava at Rača	<ul style="list-style-type: none">• Nearly 15% of GDP lost.• 13,200 km² flooded.• Over 1 million people in 46 municipalities affected.• 25 lives lost.
Aug. 2014	Northern and Western BiH. All areas along the Sava, Sava tributaries: Una, Vrbas, Banja Luka, Gračanica, Tuzla, Foča, Višegrad, Zvornik, Žepče, Lukavac, Zenica	<ul style="list-style-type: none">• Some 200 homes evacuated.





Floods and landslides



More than 1000 landslides annually in the BiH (depending on climate characteristics). In 2010 30 appeared in Banja Luka, 41 Lopare, 50 Zvornik, and 763 in Sarajevo canton.





Erosion, Drought and Forest Fires

Erosion

Total average annual erosion 16,5 mil m³, while specific annual erosion is 323 m³xkm² for BiH
The new Erosion Map of RS was designed in two phases (restructuring of erosion map and innovation of erosion map) during 2011.

More than 80% of the BiH territory exists on slopes exceeding 13% water-induced erosion is an increasingly present problem (unplanned exploitation of forests and total deforestation of the terrain).

This phenomenon is most prevalent in central and southern parts of the country where the annual quantity of precipitation amounts to no less than 2,000 mm.

In the northern part of BiH hydromorphic soils are dominant on flat and slightly hilly terrains. In those areas erosion risk is at a much lower level from the point of view of potential erosion, but agricultural production is the basis of the intensive development of erosion processes, and on these soils surface erosion happens. In addition, besides water erosion, one should not forget the risks of aeolian erosion in the southern part of the country where shallow soils dominate on limestone/dolomite substrata with extensive vegetation or without and the risk of aeolian erosion is high.





Erosion, Drought and Forest Fires

Drought - Irrigation system

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

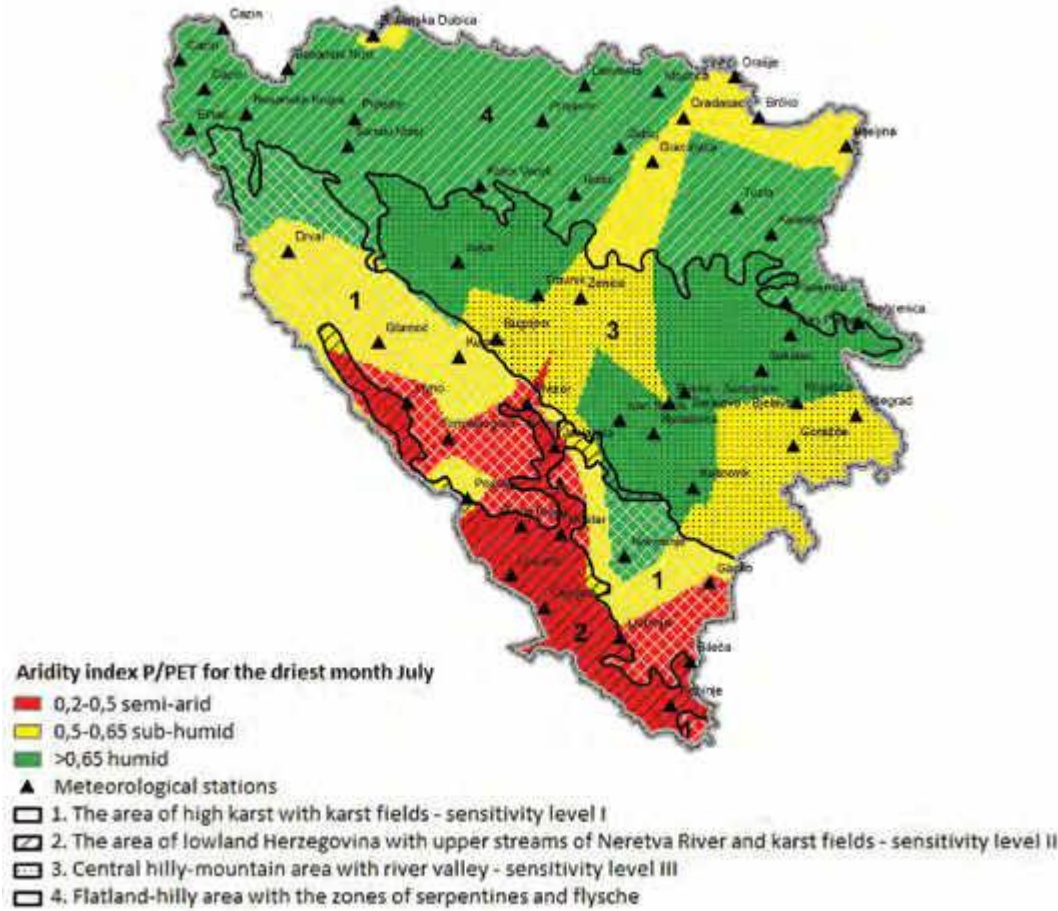
Forest fires

In BiH, 335 fires were recorded in 2009, covering the area of 2,406.60 ha, causing the damage in the amount of 1,712,330 KM. There was an increased number of forest fires in 2012, which was an extremely dry year.

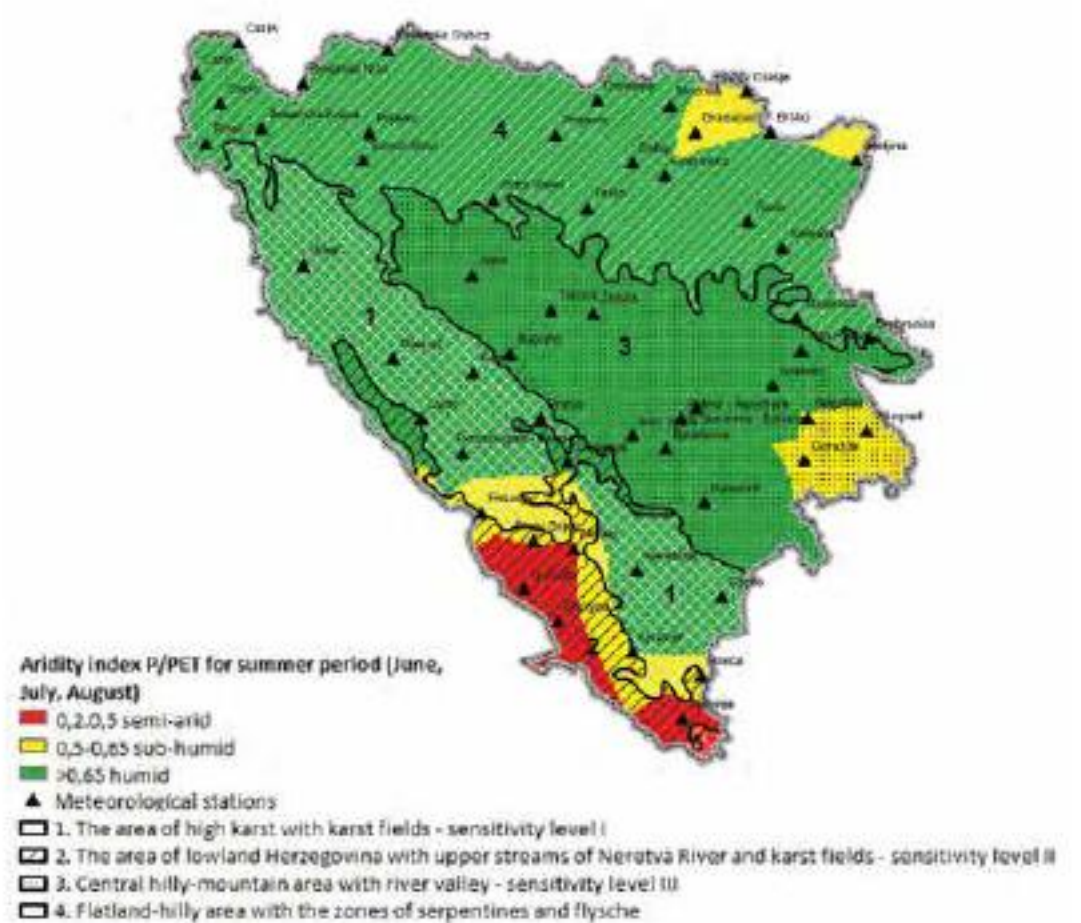




Drought



July

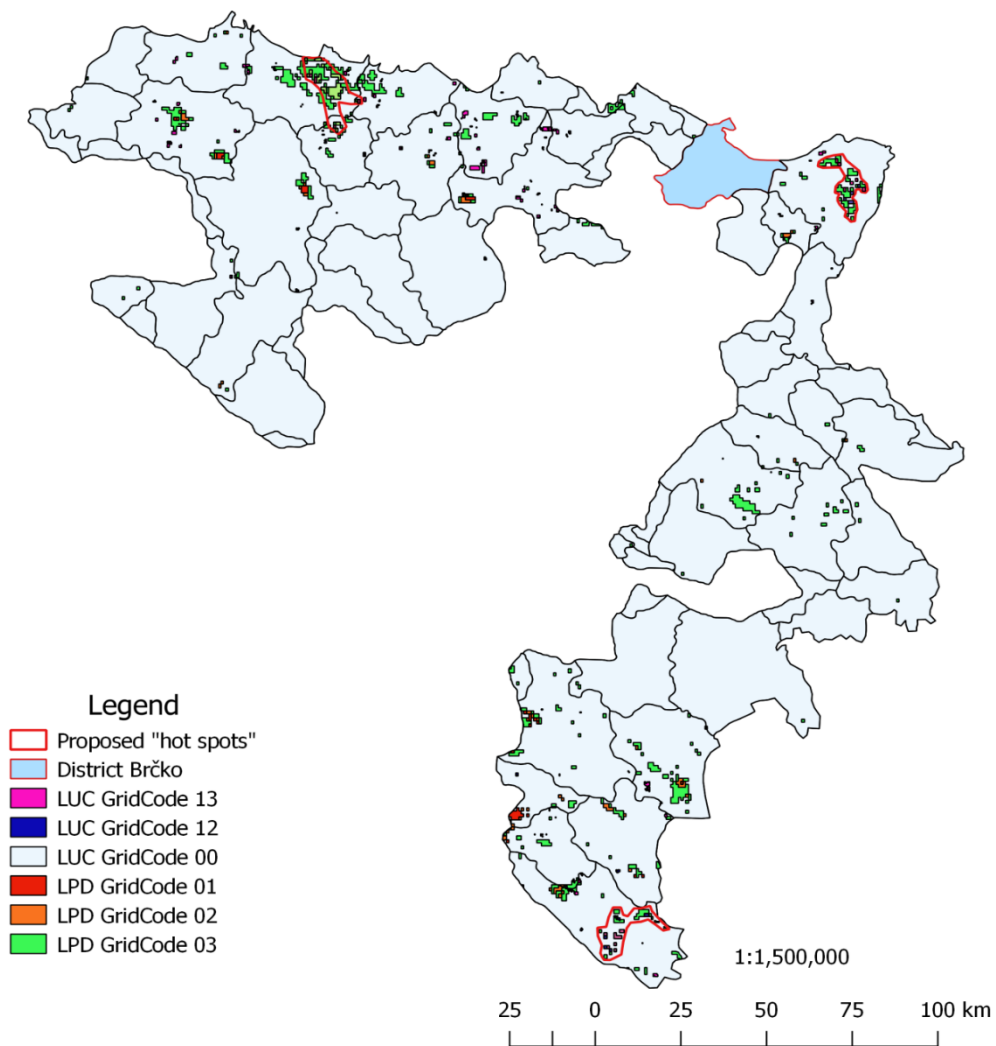


Annualy





LD hot spots in the RS





Conclusions

- ✓ The Republic of Srpska does not have soil monitoring system needed for sustainable land management
- ✓ Complex administrative and political structure complicates soil protection in general
- ✓ Monitoring of soil erosion is important step for land use planning system of the Republic of Srpska
- ✓ Soil erosion, torrents and floods are recognized as land degradation drivers trough LDN process in the RS





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THANK YOU FOR ATTENTION

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