PROJECT

„CB007.2.32.050 „Soil Protection Initiative Now! SPIN“, financed under the INTERREG – IPA CBC Bulgaria – Serbia 2014 - 2020 Programme

ACTIVITY

„DEVELOPMENT OF A CROSS – BORDER ACTION PLAN FOR SOIL PROTECTION“

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Content

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Cross-border action plan for soil protection under a project

CB007.2.32.050 **"Soil Protection Initiative Now! SPIN** "

funded by the INTERREG Program - IPA CBC Bulgaria - Serbia 2014 - 2020

1. SHORT - TERM COOPERATION INITIATIVES

1.1 Main measures and events of interstate and scientific nature

The conducted researches and the prepared proposals will integrate scientific ideas, knowledge and experience in the field of pedology and practices in soil protection. The object of study - the soil, is one of the most important parts of the natural environment. The ecological properties of soil are related to basic soil functions, such as biomass production, retention, filtration and transformation of nutrients and water. Soils are considered to be one of the youngest components of natural landscapes and are therefore highly vulnerable.

Soil formation occurs over very long periods of time and once the soil is destroyed, it is effectively lost to present and future generations (Kibblewhite, 2005). In order to realize the sustainability of the soil, it is necessary to get an idea of the processes that lead to unsustainable use of the soil and the resulting unsustainable trends.

Soils are complex adaptive systems (Crawford et al., 2005). Differences in climate, geological origin, vegetation, land usage and historical development and human activity also make soils extremely variable (Dimas & Potocnik, 2005). This fully applies to the processes leading to soil degradation.

Soil degradation and declining agricultural land productivity increase pressure on society and natural ecosystems. Soil degradation is expressed in the reduction of the potential of the soil to perform important functions in the ecosystem, caused by biophysical, socio-economic and political factors (Lal, 2009). The condition of soils affects the environment, the economy and society as a whole. Without functioning soils, life on Earth would not be possible. The growing human population and dwindling natural resources, social instability and environmental degradation pose serious threats to the natural processes that sustain the global ecosphere. (Costanza et al., 1992).

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To a large extent, natural soil regeneration is impossible or can take a very long time and is limited in space, which means that soil is a non-renewable resource. Global assessments of the degree of degradation and vulnerability to degradation processes show that this is becoming a global problem. According to Eswaran & Reich (2002), 34% of the world's land (44 million km2), supporting 89% of the world's population (4.9 billion people), is considered endangered. Sustainable development presupposes a future and intergenerational justice (Becker, 2005), as well as an expression of the interdependence between us humans and our natural environment, including ecological and socio-economic criteria of equal importance. Smith and Powlson (2003) define soil sustainability as "soil management that meets the needs of the present without compromising the ability of future generations to meet their own soil needs.".

This plan aims to address soil protection, a priority area in the EU's thematic strategy on soils. In-depth knowledge of the natural conditions and resources in the Green Belt of Europe - the border area between Serbia and Bulgaria will allow the use of the method of analogy in making adequate decisions. They will bring real results and benefits to the population on both sides of the state border.

№	Measure	Motives	Contractors	Indicators and Monitoring
1	Creating a methodology for integrating scientific ideas, knowledge and experience in the field of pedology	Using the analogy method when making adequate decisions	Expert lecturers.	In-depth knowledge of natural conditions and resources in both countries
2.	Overcoming the diversification in the spatial study around the state border between Bulgaria and Serbia	Intensification of interaction between State and municipal bodies	Universities, Institutes/ Organizations on the basis of national legislation	Monitoring sites with a set of sensors for research and analysis of soil interactions with climatic, geomorphological and partly hydrological processes

The results will support the partnership of the State and municipal authorities in Kyustendil with Bosilegrad, Treklyano with Surdulitsa, Trun with Tsarna Trava and Babushnitsa, Dragoman, Godech and Berkovitsa with Dimitrovgrad, Georgi Damyanovo and Chuprene with Pirot, Belogradchik with Knyazhevats; Makresh, Kula and Boynitsa with Zaichar, Bregovo with Negotin. Focusing on the affiliation of municipal spaces to cross-border river basins is the basis for diversification of the state border. It is

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necessary, for the overcoming of the peculiarities of the created cartographic products by Bulgaria and Serbia with unsynchronized thematic content, but also as a basis for creating a synthetic approach to obtaining new geographical patterns and cartographic images. The Community in the use of cartographic attributes and the representation of areas uninterrupted by a state border is an initial cooperation initiative.

The river basin of the Nishava River is cross-border. (Fig. 1) The valley formed by its tributaries Visochitsa, Gaberska, springing in Bulgaria and Erma originating in Serbia, drains lands in Godech, Dragoman, Trun, Dimitrovgrad and Pirot. The municipalities of Tsarna Trava and Babushnitsa are drained from Vlasina with a catchment area entirely on the territory of Serbia. Part of the area of the Danube outflow area is through the Southern (Bulgarian) Morava.

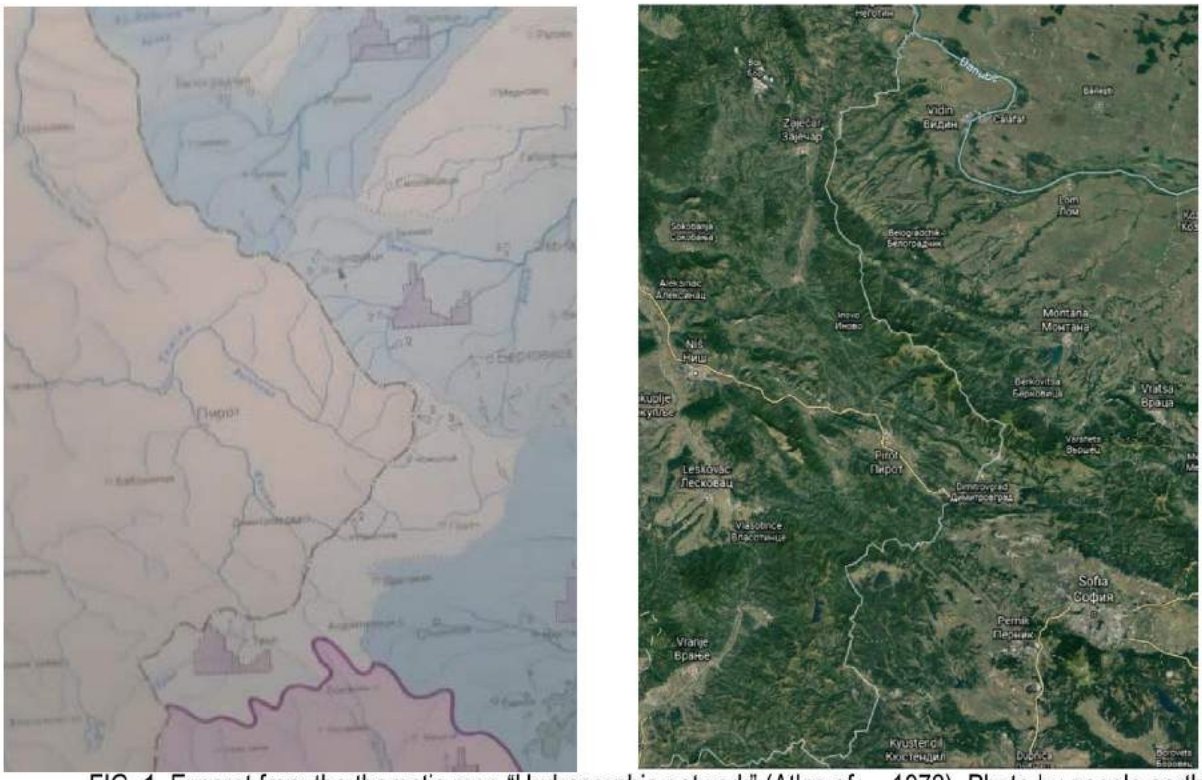
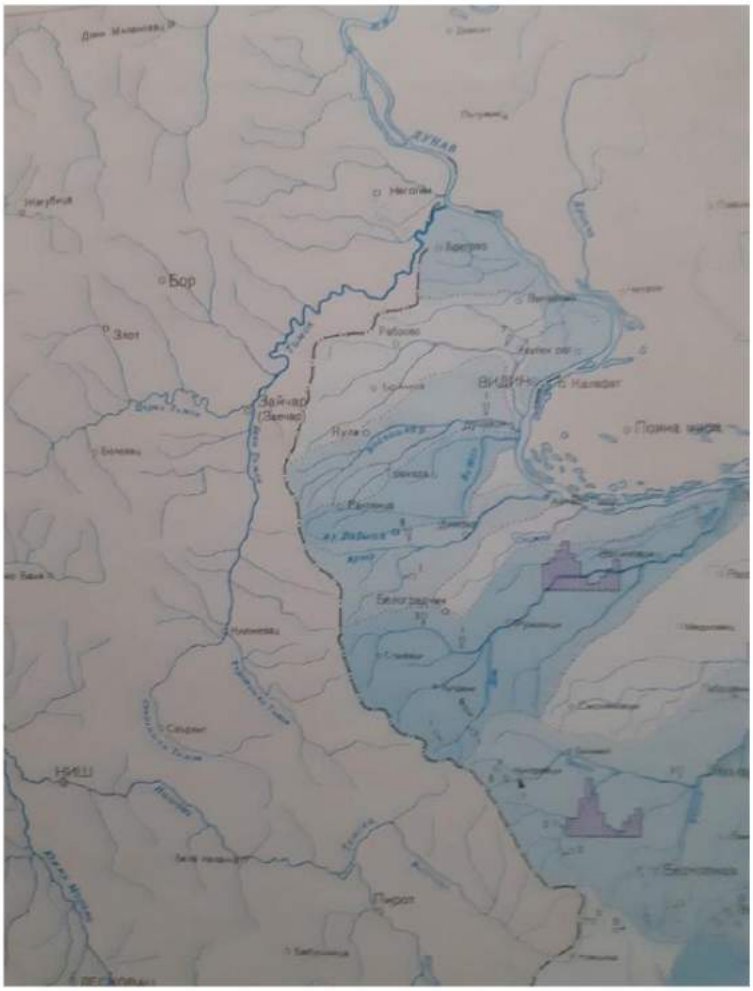


FIG. 1. Excerpt from the thematic map "Hydrographic network" (Atlas of..., 1973). Photo by google earth 11.06.2020.

To the east of the Moravian, the Timosh river valley is also cross-border. The beginning of the river Shashka, a right tributary of Beli Timok with an inflow into Cherni after Zaychar, is below the village of Kireevo. The second case when the state border does not follow the watershed with Timok is at the foot of Bachishte peak (371.7 m). It crosses the spring parts of Bezlanitsa, a right tributary of the Timok and separates an area of seventeen square kilometers from the Timok watershed to the Kula municipality. (figure 2)

The limiting factor "state border" is the reason for interruption of the integrity and connectivity of the catchments in the pointed cases. The watersheds between the river basins have traditionally been used to limit the spatial scope of lands and other units of administrative division. Thus, the overlap of the state border on the watershed of Babin Nos limits the elongated catchment basins of Topolovets, Voinishka, Vidbol, Archar and Skomlya from the Northwestern rivers in parts of the Western Danube Plain and Western Fore-Balkans within the municipalities of Beychik and Kulitsa, Kulala, Kulala and Kulala. The river valley of the river Lom drains the municipality of Chuprene, and of the river Ogosta, Georgi Damyanovo and Berkovitsa within the Pre-Balkans and the Balkan Mountains.



2. Excerpt from the thematic map "Hydrographic Network" (National Atlas, 1973.)

The sixth coastal valley, the Struma, is bounded by the Balkan watershed, the line separating the Black Sea and Mediterranean runoff basins. From Ogorelitsa peak (1317.9 m) in the mountain Bloody Stone, end point on the territory of Bulgaria in the municipality of Trun, and through the dome of Veliki

Stresher (1876 m), the highest point in the mountain Vardenik, to the peak Besna Kobila (1922m) continues and separates the catchment area of the Morava River in the municipality of Bosilegrad. Through the mountains Pataritsa and Dukat, lateral of the Balkan watershed, it borders the Vardar region from the Struma valley to the border with Northern Macedonia and follows east to the three-border pyramid number 456 in the area of Zheravino (Fig. 3).

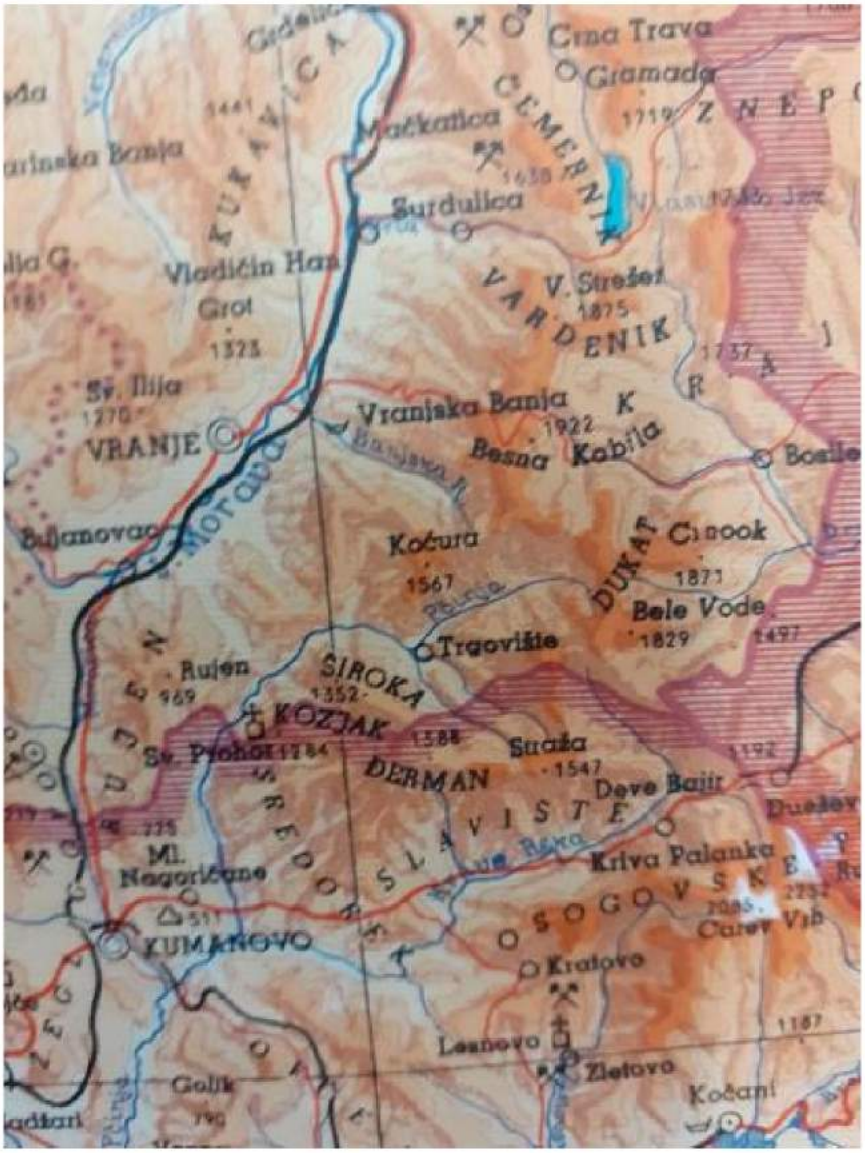
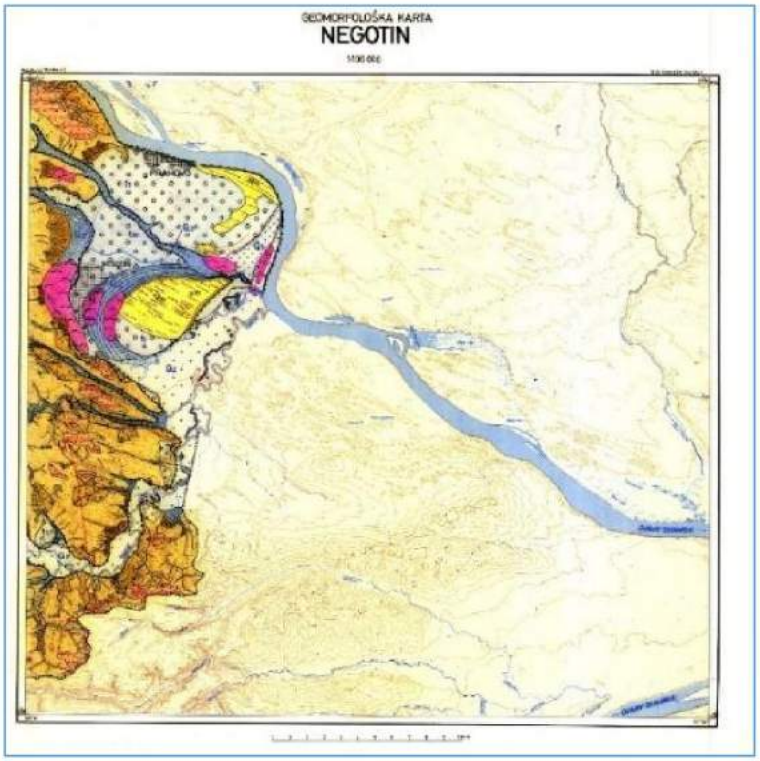


FIG. 3. Fragment of the map "Jugoslavija" (scale 1:1.250.000, Beograd, 1958)

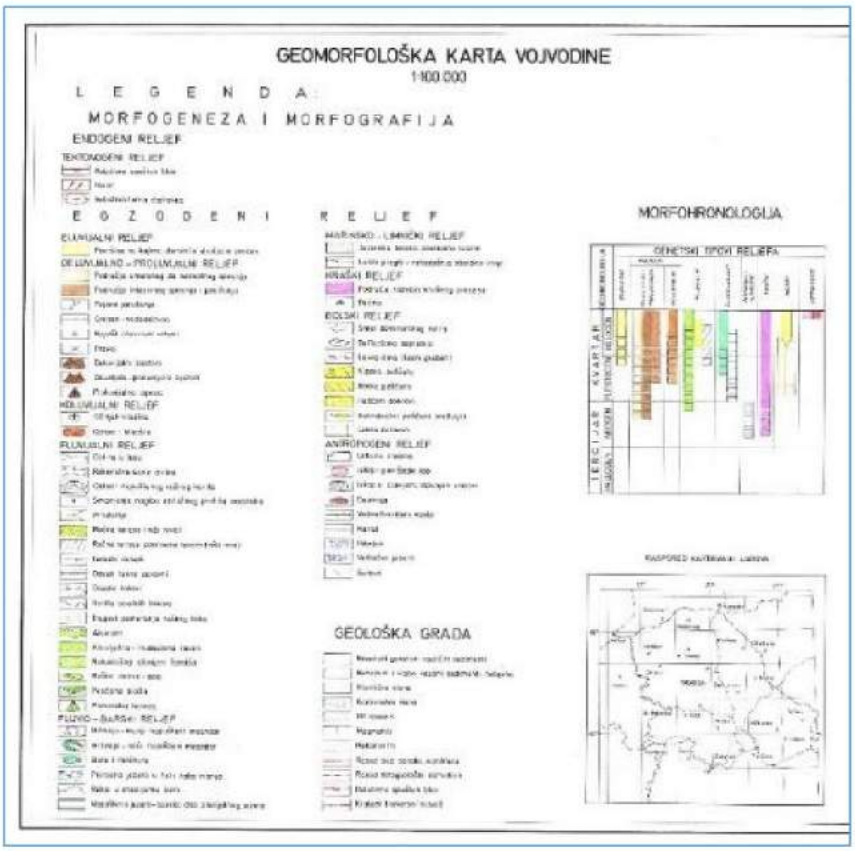
№	Measure	Motives	Contractors	Indicators and monitoring
3	Demarcation of the affiliation of the	Basis for creating integrated	National and regional agencies / services	Cadastral sheets determining the

	administrative units from the eligible region to cross-border coastal valleys	geographical patterns and common, interstate cartographic images.	maintaining cadastral maps	way of permanent usage of lands and soils
4.	Compilation of a methodology for cartographic attributes for presentation of thematic content areals, which are uninterrupted from the state border	Overcoming the originality of cartographic products created by Bulgaria and Serbia, non-synchronized in cross-border space	Experts from the Faculties of Geography and Geographical Institutes of Serbia and Bulgaria	Preparation of reports, analyzes and studies of the natural potential

The outlines of the six coastal valleys will be the basis for specifying the nomenclature of used relief elements in the river valley and compiling a unified Serbian-Bulgarian legend on a geomorphological map similar to the map sheet Negotin from Geo-morfološka karta 1: 100000 (Fig. 4.) and the corresponding Legend (Fig. 5). The created cartographic product is an obligatory condition for linking the areals of the soil varieties.



Фиг. 4. Geomorfološka karta 1:100000 "Negotin" (razmera 1:100.000, Menkoviċh, G.I)



Фиг. 5. Geomorfološka karta. Legenda (razmera 1:100.000, R.O. Geološki.Institut)

№	Measure	Motives	Contractors	Indicators and Monitoring
5.	Improving the methodology and nomenclature of used relief elements in the valleys of the six river coasts	Compilation of a unified Serbian-Bulgarian legend on a Geomorphological map	Experts Geomorphologists	Referencing created maps at different scales. Mandatory condition for linking the areals of soil varieties.

The correct positioning of their diversity also depends on the results of the geological mapping completed in both countries, mapped at different scales. A good example from the Bulgarian side are the Geological maps in scale 1: 50000 from the Western Balkans and Krajina created ten years ago (Fig.6).

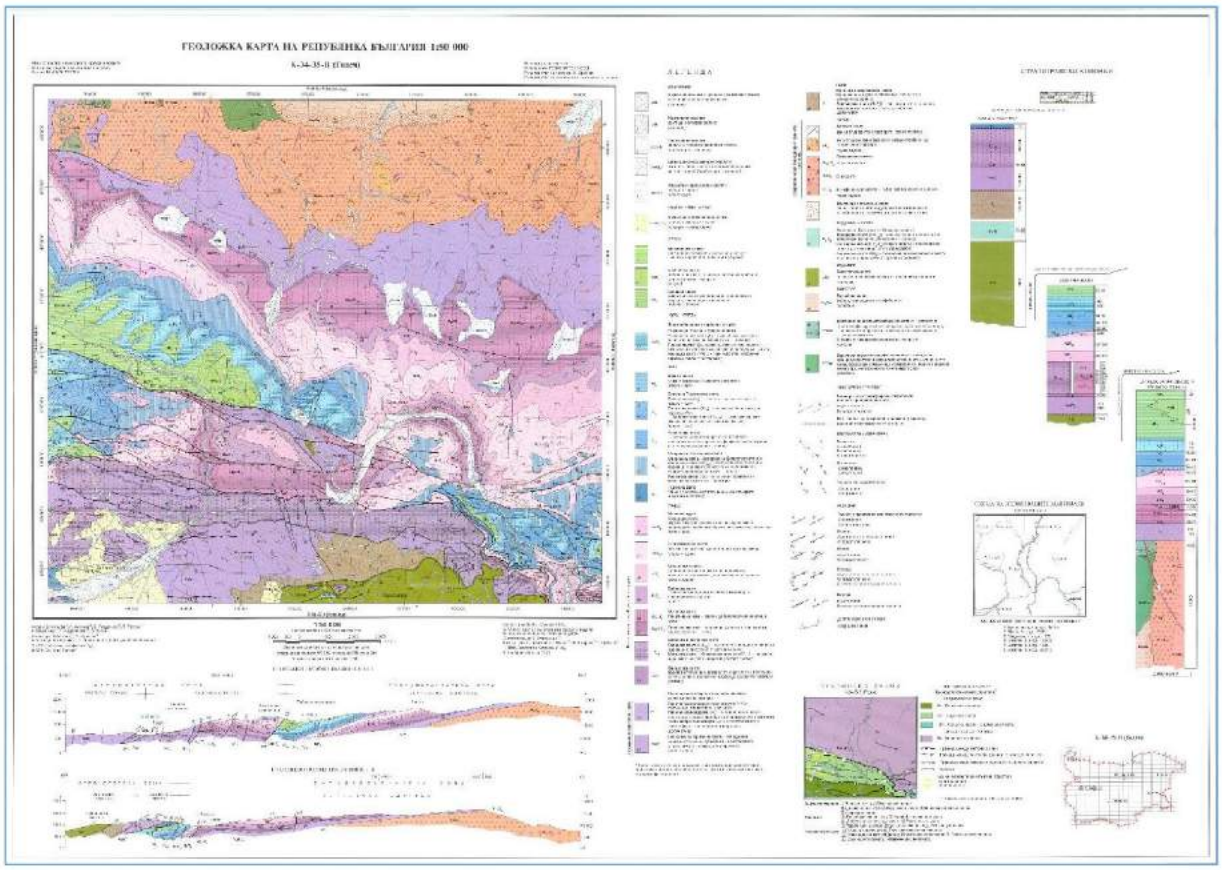


FIG. 6. Geological map of the Republic of Bulgaria 1: 50000 K-34-35-B (Godech), Bulgarian National Geological Service, 2009.

№	Measure	Motives	Contractors	Indicators and Monitoring
6.	Compilation of a methodology for synchronization of results from geological mapping, which is completed in both countries	Correct positioning of the leading soil formation factor	"Concessions and Geology" Service at the Ministry of Energy and *Geological Survey of Serbia*	Linking geological heritage mapping
7.	Achieving similarity of engineering-geological conditions and developed geodynamics in cross-border space	Prioritize geological hazards in specific territories	Experts from the "Geological Hazards and Risks" Section, GI of the Bulgarian Academy of Sciences and from the Reciprocal Serbian Scientific Institute	Preparation of communication strategy

The rock composition of the mountains: Eastern Serbian, Stara Planina, Fore-Balkan, Western Srednogorski is the reason for the very large diversity of associations of soil varieties, subordinate in height to the forest types. The joint ecological assessment of the current composition can be used for zoning, highlighting the predominance of forest-steppe landscapes, followed by steppes in the Danube plain and the dominance of the Central European deciduous Serbian-Balkan (Balkan) region according to Konteva (2000). The western Timok valley is more hilly, occupied by fields and vineyards, with fragmentary oak forests, and the eastern one is treeless and plowed. In the Serbian Ore Mountains, the Western Stara Planina and the Eastern Serbian Mountains, beech trees predominate, which do not form a continuous belt. In height they are replaced by coniferous, and on the flat tops by mountain pastures. Floristic taxonomic diversity is of two biogeographical regions - continental and limited alpine (only in the Western Stara Planina).

At the present moment, it is encouraging to illustrate the potential connections in the Green Belt of Europe - the border area between Serbia and Bulgaria, between the protected areas "Emerald" in Serbia, continuation of the ecological network "Natura 2000" outside the EU, with existing NATURA sites 2000 in Bulgaria. Understanding that habitats and species do not recognize national boundaries presupposes optimizing the spatial structure. Thus, in his 2016 study, Ass.,Assenov, analyzed the relevant literature and electronic sources and found that from Kalotina to Babin Nos there is complete overlap along on the border. Gaps and missing network connections are visible around the village of Kalotina and the Timok River. The configuration in the predominantly mountainous part of the border area between Serbia and Bulgaria to the south will fill the spatial ecological gaps in the interstate cooperation in the field of soils. The grounds for the designation of protected areas under NATURA 2000 are scientific criteria that allow the addition of new sites, reflecting the state of the environment and the spatial scope of habitat types. Therefore, they are the leading corrective among the factors, indicators for diagnosing soil differences, dominating in the areals with forest soil formation..

№	Measure	Motives	Contractors	Indicators and monitoring
8.	Optimization of the visualization and mapping of the spatial structures of the habitats and the species in the Green Belt of Europe - the border zone	Establishing the potential connections between the protected areas "Emerald" in Serbia, continuation of the ecological network "Natura 2000" outside the EU, with the already	Experts bio-geographers, botanists and ecologists	Establishing full overlap, gaps and missing network connections at the border. Recommendation of the criteria defining NATURA 2000 protected areas for leading correctives among the factors, indicators for

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	between Serbia and Bulgaria	existing sites NATURA 2000 in Bulgaria		diagnosing soils with forest soil formation

We recommend that the initial consideration of the relationship between the types of soil formation in Bulgaria and Serbia to be positioned sequentially to the plains, foothills, slightly sloping slopes and dissected mountain terrains in the cross-border area. The Soil Classification Standard is the third edition of the World Reference Base for Soil Resources (WRBSR), updated in 2015, approved by the International Union of Soil Science (IUSS). According to the first hierarchical classification level of WRB 2014, among the 32 reference soil groups (RSG) in the cross-border map area at a scale of 1: 2200000 (Fig. 7) with an explanatory note in the Soil Atlas of Europe (2005), European Commission publications are presented 10 reference soil groups. These are Cambisols (the correct symbol is no longer B, but CM), Leptosols (respectively here - LP), Luvisols (also - LV), Fluvisols (- FI), Umbrisols (-UM), Phaeozems (-PH), Chernozems (-CH), Vertisols (-VR), Planosols (-PL) and Gleysols (-GI). The names of the specific soil processes and additional characteristics according to the requirements in the lower classification level are added to the names. From FIG. 7 shows that on the plain - up to 200 m. and low plateau relief - up to 300 m. in Northern Bulgaria develop two species from the group of Chernozems - Calcic Chernozems - carbonate and Chernic Chernozems - leached in the Bregovo and Vidin lowlands. The Timok River is not a boundary for their areal of dissemination. Serbian pedologists will confirm it and will require a revision of the proposed product of the European Commission and is a motivation for joint short-term soil mapping.

The areas around the town of Kula, the village of Rabisha, the village of Ruzhintsi and the northern part of the Serbian Ore Mountains are low-plateau. In the areal of zonal manifestation of Chernozem in Bulgaria is differentiated azonal manifestation of Arenosols (AS) according to Ninov, N. (2002), in association with the above, also with automorphic genesis, are the transitional Luvic Phaeozem (Hi) and Haplic Phaeozem. They have a wider altitude range and are one of the foothillish in Northern Bulgaria and Northern Serbia. The westernmost stretch of the leached ones is over clays and sands between the catchment areas of the Vidbol and Archar rivers, and of the ordinary ones, near the confluence of the Morava river with the Danube. The genesis of the soil profile includes characteristics created in both accumulative and eluvial conditions. Pre-existing forests have led to the presence of fulvic acids in the composition of humus. In the lowlands and valleys, soil formation is influenced by modern or past hydromorphism. Characteristic are the originalities of the the Balkan Peninsula, having analogues in Asia and Africa, smolnitsa. They are pellic - dark vertisol (displaced), developed on terrigenous conglomerates,

sands and clays within the Gaber valley, Pirot and Nis valleys. Diagnostic features are the morphological inexpressiveness in the profile, the lack of textural differentiation, the presence of montmorillonite clays, quantitatively unchanged in depth.

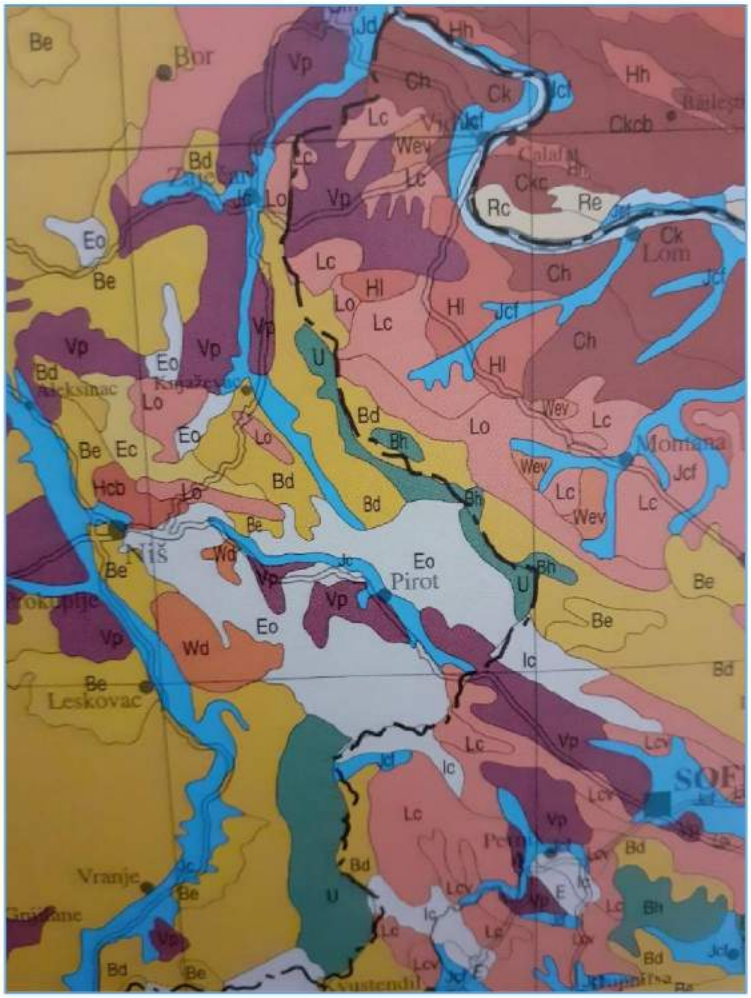

FIG. 7. Fragment of a map to scale 1:2200000, pate 15, Soil Atlas of Europe (2005)

Ck – Calcic Chernozem; Ch – Chernic Chernozem; Hi – Luvic Phaeozem; Vp – Pellic Verti-sol; Wev – Eutri-vertic Planosol; Lc – Chromic Luvisol; Lo -Haplic Luvisol; Bd – Distric Cambisol; Be – Eutric Cambisol; Bh – Haplic Umbrisol; Ic – Calcari – lithic Leptosol; Jcf – Calcaric Fluvisolsol; Eo – Rendzick Leptosol; Hcb – Calcarick Phaeozem; Gm – Mollic Gley-sol; Hh – Haplic Phaeozem; Lcv - Chromi-vertic Luvisol; Wd – Dystric Planosol;

In southwestern Bulgaria the soils of the transition between the valleys with the foot slope inclines are Chromi-vertic Luvisol in the Breznitsa, Divlyanska, Gaberska and Sofia valleys on the terrigenous-coal and in Razmetanitsa continental-molasses sediments. We explain their absence, on the territory of Serbia by the scale and the load of thematic content in the map and is another reason for synchronizing

the results of the national surveys. The weak textural differentiation between the eluvial and illuvial horizons in the profile and the similar transitional location in space distinguishes them from the Fayozems only by the clayey montmorillonite mineral composition..

Eutri-vertic Planosol and Dystric Planosol - pseudo-podzolic soils - with characteristic surface moisture develop around the lower summit boundary and in the relatively flat sections of the foot, with relative abundance of water. Their genesis is the result of the alternation of aerobic and anaerobic regimes. The distribution limits depend on the depth of the groundwater, on the proximity between poorly incised rivers, such as the Voinishka, Topolovets and Yuzhna Morava rivers in the Leskovac valley. The location of the Planosols is situated in the fault strips separating the Pre-Balkans and the Central Mountains from the Balkan Mountains. In essence, they are the third and fourth transitional soil types after Luvic Phaeozem и Chromi-vertic Luvisol.

The third soil type, occupying local lowest parts of the relief, is Mollic Gleysol not only west of the Timok estuary, but also around the town of Bregovo. Also having a single surface horizon - Calcari-lithic Leptosol, Rendzick Leptosol (Ic / Eo) and Calcaric Fluvisol (Jcf / Jc), genetically related to a specific rock base near the topographic surface are arranged in a mosaic. The distribution of mountain soils - unsaturated brown (Bd, Distric Cambisol), saturated brown (Be, Eutric Cambisol) and mountain meadow (Bh, Haplic Umbrisol) is within the Humid and Superhumid type of climate of Thorntuit, 2010 (Sarafov). The main leading process in the first two is the inner soil claysification. A characteristic feature is the undifferentiated mechanical composition in the soil profile. The accumulation of organic matter is the other specific process, creating a large amount of humus in the peat horizon of the Umbrisols around the upper border of the forest in the high mountain belt..

The proposed emphasis on the specificity of soil formation aims to form grounds for the delineation of transboundary soil areas in the peripheral territory of Serbia and Bulgaria..

We will specify that in order to characterize the main soil differences in the country in terms of their physical and chemical properties, usually are selected the so-called representative or typical soil profiles. Such information is contained in the monograph “Soils in Bulgaria” (Antipov-Karataev et al., 1960), which presents data on selected soil profiles from a total of 400 analyzed during the 9-year study for the development of average the large-scale soil map for the country in M 1: 200 000 (Tanov, 1958). The possibilities for using archival information as a reference for monitoring and spatial comparisons are

hampered, on the one hand, by the lack of information on the location of profiles and, on the other hand, by differences in laboratory methods for analyzing some of the properties. This requires unambiguous compliance with current standards for soil classification on both sides.

№	Measure	Motives	Contractors	Indicators and Monitoring
9.	Synchronization leading to unambiguous compliance with the soil classification standards of the third edition of the World Reference Base for Soil Resources (WRBSR - updated in 2015), approved by the International Union of Soil Science (IUSS).	Linking soil formation types in Bulgaria and Serbia with their positioning towards flat, pre-top, slightly inclined, inclined and dissected mountain terrains in the six coastal valleys	Experts pedologists / soil scientists	Emphasis on specificity in soil formation in order to form grounds for the delineation of crossborder soil areas in the peripheral territory of Serbia and Bulgaria.

The methodological bases for assessment of the factors and the risk of surface, water and wind erosion of the soil, developed by the US Department of Agriculture and adapted to Bulgarian conditions by the scientists from IP "N. Pushkarov "(Ruseva and team, 2010) would motivate for synchronization with the scientific results from the Serbian side. Estimates of the factors and risk of surface-water erosion of the soil, based on a forecast model called the Universal Soil Loss Equation (USLE) and the risk of wind erosion of the soil have mathematical expression. In contrast to the USLE model for predicting the probable average annual soil losses from deflation, it expresses a functional dependence. The publication publishes regional information on the project "Soil Sustainability in Europe Based on Critical Zone Research" (SoilCritZone) (2010) and at the municipal level.

№	Measure	Motives	Contractors	Indicators and Monitoring
10	Assessing the factors and risk of surface water and wind erosion of the soil, according to the methodology developed	The methodological bases, adapted and validated for Bulgarian conditions, are a motive for	A team of scientists from the Soil Erosion Section of	Based on a mathematical expression of a forecast model called the Universal Soil Loss

	by the US Department of Agriculture, based on research in the critical area "(SoilCritZone) and at the municipal level.	synchronization with scientific results obtained on the Serbian territory.	IPAZR "N. Pushkarov "	Equation (USLE) and the risk of wind erosion of the soil

The percentage share of the areas with minimal slopes (up to 3 °), the lands with a slope from 3 ° to 9 °, between 9 ° to 15 ° and the labor-intensive ones with a slope over 15 ° almost unsuitable for plant growing, resource for pasture development of animal husbandry in all Bulgarian municipalities bordering with Serbia. On the example of the municipality of Breznik, the information is supplemented (Fig. 8) through the observations of Bozhkov (2016) and a set of maps representing the spatial distribution of the inclines of the slopes.

The mapped regional information, published under the editorship of Prof. Dr. Svetla Ruseva, provides opportunities for interpretation of the content of the thematic maps of rain erosion, susceptibility to soil erosion, the potential risk of surface water erosion, wind erosion, susceptibility soils to deflation and the actual risk of wind erosion.

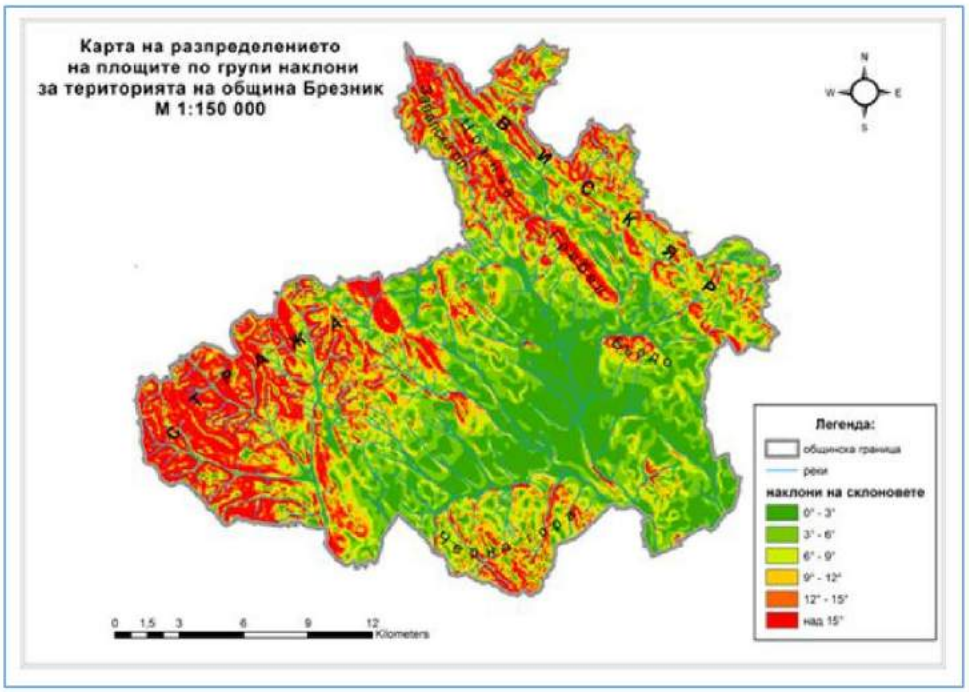

FIG. 8 Map of distribution of the areas by groups of slopes, Breznik municipality; created through ESRI ArcMap 10.0 based on ASTER GDEM, provided for free access by the MoEW under a project with the Japanese International Cooperation Agency (Bozhkov, 2016)

The formation of grounds for the delineation of crossborder soil erosion areas in the peripheral territory of Serbia and Bulgaria will be a good example of practical and scientific cooperation.

№	Measure	Motives	Contractors	Indicators and monitoring
11	Land usage planning in accordance with the suitability of the lands for effective anti-erosion land use depending on a series of limiting factors and threats	Formation of criteria for differentiation of cross-border soil-erosion areas in the territory peripheral for Serbia and Bulgaria.	A team of scientists from the Soil Erosion Section of IPAZR "N. Pushkarov "	Interpretation of the content of thematic maps created within the municipalities of rain erosion, susceptibility to soil erosion, the potential risk of surface-water erosion, wind erosion, soil susceptibility to deflation and the actual risk of wind erosion

1.2 List of soil protection measures, proposed during the project activities

The European Thematic Strategy for Soil 2006 focuses on implementing policies to improve the environment in order to ensure adequate soil protection in Europe. Key threats to the soil itself related to soil conditions in Europe have been formulated and accepted. Soil degradation is a violation of its functionality as a result of processes that lead to deterioration of its quality as a component of the environment and natural resources. Referred to, soil functions and key threats are presented in tabular form as follows:

Soil functions	**Soil threats**	**Outgoing soil functions, degradation**	**Factor for soil degradation**
Food and biomass production	Sealing	Sealed area, land use	Change in land cover, Structuring of agricultural and forest lands, Soil management and tillage practices, Excessive grazing,
	Erosion	Soil loss, reduction of the rooted layer, amount of nutrients, moisture, deterioration of the soil structure	
	Loss of organic matter	Increased degree of mineralization and change of	

Soil functions	**Soil threats**	**Outgoing soil functions, degradation**	**Factor for soil degradation**
		organic carbon stocks in the soil	Soil wear off from walking animals and humans,
	Loss of bio - diversity	Fragmentation of species diversity and activity	Soil damage from tractors and off-road machines,
	Pollution	Deposition of nutrients and contaminants, acidification	Deforestation and fires,
	Compaction	Reduced porosity and deteriorated structure	Prolonged conflict,
	Hydrogeological risks	Depending on the type of event	Stubble burning, Drainage,
	Salinization	Increase in water-soluble salts and decomposition of aggregates	Decreased productivity,
			Desertification
Storage, filtration and transformation	Sealing	Loss of soil functions	Change in land cover,
	Erosion	Loss of surface soil layer, water reduction, filtration and buffering capacity, organic matter content	Deforestation,
	Loss of organic matter	Темпове на промяна на запасите на органичен водород	Soil management,
	Loss of bio - diversity	Increase in greenhouse gas emissions	Drainage conditions
	Pollution	Dispersion of contamination	
	Compaction	High runoff, reduced filtration capacity	
	Hydrogeological risks	Depending on the type of event	
	Salinization	Humidity regime	
	Sealing	Habitat fragmentation	Desertification,

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Soil functions	**Soil threats**	**Outgoing soil functions, degradation**	**Factor for soil degradation**
Biological habitat and gene pool	Erosion	Loss of surface soil layer, reduction of nutrients, water, organic matter, loss of biodiversity and deteriorated structure	Ground cover, Excessive grazing, Deforestation, No protection of arable land and poor irrigation practices, Inadequate agricultural practices
	Loss of organic matter	Decrease in the quality of the organic matter	
	Loss of bio - diversity	Microbial frequency levels	
	Pollution	Absorption of contaminants	
	Compaction	Decreased mobility and biological activity	
	Hydrogeological risks	Depending on the type of event	
	Salinization	Complete stress on the species	
A platform for man-made structures	Sealing	Запечатана площ, зелени зони	Socio-economic factors for urbanization, Drainage conditions, Change in land cover
	Loss of bio - diversity	Habitat fragmentation, urban population growth	
	Hydrogeological risks	Distribution of water in the landscape, loss of soil function	
	Pollution	Waste disposal	
Source of raw materials	Sealing	Sealed area, absorption of green areas	Formation of natural landscapes
	Hydrogeological risks	Soil removal rates	
Natural and cultural heritage	Sealing	Запечатана площ, поглъщане на зелени зони	
	Erosion	Sedimentation levels	

Soil functions	**Soil threats**	**Outgoing soil functions, degradation**	**Factor for soil degradation**
	Hydrogeological risks	Depending on the type of event	

It is of paramount importance to implement activities to unify the knowledge between the partner organizations about the effect and behavior of substances under different conditions (ecosystem type, input models, pedological, geographical and climatic situations). Efforts are also being made to harmonize and standardize soil protection, including analytical methods and quality control. Improving the knowledge of the content and dynamics of substances in soils from predominantly background, border areas, relatively poorly studied and in different geographical regions will be of national importance for both countries..

№	Measure	Motives	Contractors	Indicators and monitoring
1	Improving the awareness about the risks, during soil protection	Necessary elements of anti-erosion design against the first, according to the Bulgarian legislation, damaging the soils, process - erosion	Regional inspections for environment and water	Presentation of data on the different types of risk at the public events of the project

The Bulgarian Soil Act in Art. 12 regulates and defines soil damage processes in the following sequence:

1. Erosion;
2. Acidification;
3. Salinization;
4. Compaction;
5. Reduction of soil organic matter;
6. Pollution;

7. Sealing;

8. Landslides;

9. Swamping.

In addition, a comparative test for the representativeness of monitoring points and soil differences was carried out in Bulgaria, probably in Serbia as well, after monitoring campaigns in southwestern Bulgaria (Shishkov et al., 2009). At the national level, soil monitoring is established and carried out in a uniform network of 16 x 16 km in 397 monitoring points by the regional inspections of the Ministry of Environment and Water (MoEW). The program for this monitoring was approved by the Minister of Environment and Water in 2004. The content of organic carbon and total nitrogen in the surface 0-30 cm layer, pH and indicators for diffuse soil pollution (content of heavy metals and organic pollutants) are monitored.) in different ways of land use - arable land, pastures and meadows. It is planned to determine the volume density over a 5-year period.

Soil erosion is a phenomenon associated with the separation and transportation of soil particles by wind, rain and irrigation water during natural and / or anthropogenic processes. Soil erosion is recognized as one of the most serious global problems of the natural environment. According to the world map of anthropogenic soil degradation, water erosion is the most significant degradation process, accounting for 53% of total soil degradation. Estimates for the average annual soil losses from erosion range from 0.0045 to 0.45 t / ha depending on the incline of the slope under natural conditions and from 45 to 450 t / ha - under arable land conditions. In parts of southern Europe at the end of the twentieth century, soil erosion brought the soil to a stage of irreversibility, as there was no soil left to be eroded. There is almost no country in the world, nor a way of land use, where it is not necessary to apply means to protect the soil from erosion. In the early 1980s, the area of agricultural land decreased globally on average by about 3,000,000 ha due to erosion and by about 2,000,000 ha due to desertification. According to the data of the National Statistical Institute for a period of 30 years between 1960 and 1990 the area of agricultural land in Bulgaria has gradually decreased for various reasons, among which the main is soil erosion, by about 8000 ha per year from 4,8809 to 4,6427 million ha.

For the conditions of Europe, the erosion of 20 to 40 t / ha from a single precipitation is likely to occur once every two or three years, and the erosion from individual extreme rains can reach up to 100 t / ha once every 5-6 years. With very low intensity of soil formation processes, any soil loss greater than

1 t / ha y can be considered irreversible if it is permanent for a period of 50-100 years. The main causes of erosion are still improper agricultural techniques, deforestation, excessive grazing and construction work on sloping areas..

The natural conditions (relief, climate and soils), the way of land management and the inefficient application of the legislation determine the soil erosion as the most serious threat to the soil in the agricultural lands of Bulgaria. About 3 730 000 ha (65% of the area of the managed lands) are affected by water erosion, and about 1 350 000 ha (24% of the area of the managed lands) - by wind erosion.

The projected potential soil losses from surface water erosion of the soil in Bulgaria amount to an average of 902.5 million tons per year, over 50% of which are formed from the territory of 7 districts, including Sofia (112.6 Mt/y).

The estimated potential soil losses from wind erosion of the soil from the arable lands with a slope below 3o in Bulgaria amount to 1163.5 thousand tons, about ¾ of which are formed on the territory of 6 regions, among which again only Sofia has 45.0 Kt / y. 22.3% of the arable lands with a slope below 3o in Sofia region are at risk of deflation over 1 t / ha y.

Soil loss has a significant impact on the ecological and economic functions of the soil, both at the site of erosion and in the adjacent areas. Soil erosion leads to a decrease in the depth of the root layer, the amount of nutrients and soil moisture reserves; depletion of the filtering and buffering capacities of the soil; reducing the content of soil organic matter; biodiversity loss; degradation of the soil structure, formation of soil crust; distribution and accumulation of pollutants in watercourses and in areas of sediment accumulation. While the relief, precipitation and soils create the natural preconditions for erosion, the way of use and the structure of the agricultural and forest lands can significantly reduce the losses of soil from erosion, but can also lead to its significant acceleration. As climate is one of the key factors of erosion, it is very likely that its intensity will increase significantly with the forecasted climate change.

While maintaining the current way of managing agricultural land and the emerging trend towards increasing the annual erosion of rain and wind, there is a prospect of increasing the intensity of erosion processes on the soils of agricultural land. The necessary measures are drainage and soil protection in order to provide solutions for the design of large arrays of perennials and creating an organization for anti-erosion crop rotation. It is sought to provide a protective cover of the soil surface from vegetation or plant debris in the periods of high erosion of precipitation and wind.

№	Measure	Motives	Contractors	Indicators and monitoring
2	Presentation of information on the importance for the spatial distribution of slopes on inclines in municipalities and along rivers	Mapping of labor-intensive areas and those with a incline above 15 ° almost unsuitable for the development of crop production	The team generating an up-to-date geo-database	Presentation of data on the different types of risk at the public events of the project
3	Improving the awareness for construction of reclamation-technical and hydro-technical facilities	Strengthen the banks and bottoms of erosion forms	In the functions of the Directorate "Geoprotection and Public Works" at the Ministry of Regional Development and Public Works and the relevant Serbian institution	Differentiated application depending on natural climatic and economic conditions
4	Improving the awareness of the benefits of grassing and / or forest belts in erosion-hazardous areas	It is applied to washed off / poor / eroded soils	Municipal agricultural services	Experimental sites for various demanding crops with minimal participation of trenching activities
5.	Giving guidelines for the application of various grassing practices: complete grassing, grass buffer strips, belt farming, terracing, buffer strips and belts	Determining a variant of measures with the greatest economic effect	Agricultural holdings; Forestry holdings; Scientific organizations; Municipalities.	Amount of liquid and solid outflow; Export of food elements; Soil protection capabilities; Limitation of erosion processes.
6.	Improving awareness of the application of the anti-erosion effect of annual crops	Establishing the different influence during the different phases of vegetation	Regional inspections for environment and water	Results from runoff sites for monitoring erosion processes
7	Improving awareness, diversification of agricultural technique over various slightly sloping terrains	Compliance with the water retention capacity of micro-inclines with a incline of up to 20 and micro-elevations in the relief with a slope of 30 - 40	Municipal agricultural services	Plans in scale 1: 5000 and 1: 1000 with horizontals through 0.5 and 1.0 m.
8	Improving awareness by creating anti-erosion wall terraces and ditch-walls	Protection of soils at a slope of 60 - 80 depending on their use	Municipal agricultural services	Plan, soil and soil erosion map

9	Improving awareness by creating anti-erosion stepped shaped terraces	Regulation of surface water outflow at> 10°	Municipal agricultural services	Plan, soil and soil erosion map
10	Improving awareness of harmonization and implementation of agroforestry protection standards on both sides	Correlation distinguishing the type, location and purpose of wind-break facilities	Territorial divisions in the Regional Directorates of Forestry and the corresponding ones on the part of Serbia	Mapped areas by groups of forests and functions (forest fund, provided forest fund, forest meadows and forests in the agricultural fund)

1.3 List of proposed (joint) initiatives for cooperation in soil protection

List of proposed (joint) initiatives for cooperation in soil protection:

1. To study in detail, analyze and scientifically outline the scope of the cross-border area and create a unified Geographic Information System database, using innovative and modern approaches and technologies.
2. Assess soil quality, harmonize strategies for developing reference soil values for priority pollutants.
3. To synchronize the system of the necessary parameters for analysis of soil-climatic conditions and soil productive assessment of the possible set of agricultural crops.
4. To create a database for different types of soil environment.
5. To implement projects for comparison of different erosion-denudation (landscape) situations.
6. To organize practical seminars on all soil-forming factors in a similar in terms of geological and geomorphological features, mosaic environment.
7. To harmonize the terms and methodologies regarding soil protection in both countries.
8. Creating a platform for generating data on the current state of soil pollution, as a function of the amount of pollution, the type of land use and the main soil-forming material involved in soil formation.

9. To synchronize the norms in the Regulations of the two countries, establishing the maximum permissible concentrations of certain chemical elements of soils and grouping by indicators the soils in the cross-border space of "background" and "contaminated".
10. To perform periodic joint analyzes of the acquired information with the help of statistical methods and spatial analysis in GIS environment to assess the relationship between the spatial distribution of heavy metal concentrations in soils and the morphographic units of low and high floodplain; overflow terraces, sand beams, alluvial cones, lower and upper base of the foot; slope, flat surfaces and anthropogenic forms.
11. To improve the methods for map visualization with GIS and compiling probability maps and determining the problem areas in the morphographic units for agricultural development.
12. To improve soil sampling and subsequent processes such as drying, sieving, granulometric and geochemical testing to be carried out according to standards of validated internal laboratory methods.
13. Elimination of sources that damage the soil in the sectors of the national economy, not only metals but also biologically active materials, radioactive substances, oil spills, control of waste processing plants, to reduce the risk of soil contamination.
14. Elimination of the conditions for secondary salinization (irrigation with highly mineralized groundwater, natural or anthropogenically caused deterioration of the conditions for drainage of intensively irrigated terrains, unfavorable and inconsistent with the hydro-ameliorative and soil conditions structure of the arable land)
15. Elimination of the conditions for anthropogenic acidification of the soil (surface overmoisting, unbalanced mineral fertilization)
16. Elimination of the conditions for loads of soils with heavy metals and metalloids (plant protection products, irrigation water, sludge, etc..)

1.4 Review of responsibilities and timetable for implementation of the action plan

Direct beneficiaries are the state and municipal bodies and institutions on the territory of the municipalities of Kyustendil, Bosilegrad, Treklyano, Surdulitsa, Trun, Tsarna Trava, Babushnitsa, Dragoman, Godech, Dimitrovgrad, Berkovitsa, Georgi Damyanovo, Chuprene, Pirot, Belogradchik,

Knyazhevats; Makresh, Kula, Boynitsa, Zaychar, Bregovo and Negotin, related to solving the problem of unfavourable natural processes, the regional offices of the Commission for Protection of the Population from Disasters, Accidents and Catastrophes, NGOs from the environment sector and other civil associations.

The activity envisages the formation of a team for the purpose of responsible implementation under the project activities and drawing up a detailed work plan at the operational level. The team will hold monthly meetings and prepare interim quarterly reports.

It is necessary to prepare information boards and issue educational brochures in Serbian and Bulgarian in order to raise public awareness..

1.5 Examples of good practices in soil protection identified in Vidin and Zaichar regions.

The good practices are the national standards and especially the control over the observance of the measures and the implementation of the recommendations. From the publication "Soil Protection Manual", published in Zajecar (2019), made with the support of the European Union, through the Cross-border Cooperation Program Interreg-IPA Bulgaria-Serbia 2014-2020, CCI No 2014TC16I5CB007 we review several of the theses on the regulated nine processes which are damaging the soil.

For example, in order to protect the soil from erosion, the use of riparian areas at a distance of less than 5 m from the river is prohibited. In addition, when using pastures and meadows, farmers are required to maintain a minimum density of 0.15 livestock units per hectare (LU / ha) or to perform at least 1 mowing for the year - until 15th of July for the plains and until 15th of August in disadvantaged mountain areas. A given area should be grazed for no more than: 4-6 days of cattle and 6-8 days of sheep. In the spring, grazing should begin when the pastures are well dried and stop about a month before the onset of permanent frosts to grow grass and protect soils from erosion. The existing field borders (headlands), for the same purpose, must be maintained.

Creating soil compaction is avoided by experience and culture in organizing the movement of machinery in the field and complying with the ban on the use of heavy agricultural machinery in plots with overmoisted soil. It is recommended to completely remove the tillage or change the depth of the tillage.

When an already similar compacted horizon has been formed, the use of subsoilers, rippers and paraplows is proposed..

In order to preserve the organic matter, monoculture cultivation of flax, sunflower, sugar beet, peas is prohibited on one agricultural plot for more than two consecutive years, and crop rotation is recommended. For the same purpose, the use of post-harvest residues for fertilization and / or compulsory plowing of stubble from field crops in the soil is prescribed. The incineration ban preserves the environment for favorable transformation and accumulation of organic matter.

2. MEDIUM - TERM COOPERATION INITIATIVES

Study of the spatial distribution of the content of hazardous substances in the soil.

Providing staged studies, analyzes and reports to stakeholders, leading to the possibility of timely and adequate response, greater prevention to prevent, overcoming and controlling the risky soil processes.

Build a unified, working system for updating prevention and early warning.

The acidification, the second regulated by Art. 12 of the Bulgarian Soil Act, a process damaging the soils is a naturally occurring process, the intensity of which also depends on anthropogenic factors and is characterized by lowering of soil pH, occurrence of aluminum and / or manganese phytotoxicity, depletion of soil with bases, molybdenum deficiency , suppressed microbiological activity and acid destruction of clay materials. Based on the analysis of data from medium and large-scale soil studies, it was found that the area of soils with pH <7.0 is about 6,500,000 ha, a significant part of which (4,300,000 ha) is highly susceptible to acidification (pH <5.0). About 1,500,000 ha of arable land in the plains and semi-mountains areas and 1,200,000 ha in the mountains are acidic. About 4.5% of the acidified soils in the agricultural lands have soil acidity harmful to the plants. The impact of acid rain is of limited importance.

One of the main reasons for anthropogenic acidification of soils in Bulgaria is the long-term mineral fertilization with acidifying nitrogen fertilizers, especially when it is independent, without accompanying phosphorus and potassium fertilization. Soil acidification caused by acidic industrial waste is found in limited areas neighbouring to sources of pollution. Periodic surface overwetting of soils in some areas is a prerequisite for their acidification. Soils with a high risk of harmful acidity are planosols - light gray (pseudo-podzolic) forest and pseudo-podzolic cinnamon forest, luvisols - leached, cambisols - brown forest, umbrosols - mountain-forest dark-colored, mountainous and mountainous areas in the mountains. fluvisols - carbonate-free alluvial and deluvial soils, etc. Data from observations on the acidification processes in the network for long-term monitoring of soil acidity in arable land in our country, organized by the EEA, indicate a lasting trend towards neutralization of metabolic acidity, reduction of easily mobile aluminum and hydrogen and retention of saturation of the constant sorption positions in the soil to the values of saturation in arable lands, where there is no intensive manifestation of erosion processes and no intensive fertilization activities is performed, with hydrolytically acidic mineral fertilizers.

2.1 Review of the leading medium-term elements of the Crossborder Soil Protection Action Plan

№	Measure	Motives	Contractors	Indicators and monitoring
11	Categorization of bufferity against chemical contamination	Acidification is the second regulated by Art. 12 of the Bulgarian Soil Act, a process damaging the soils	Regional inspections for environment and water	Systematizing the results of good practices in growing acid-resistant crops
12	Agrotechnological regulation of water-air regime of planosols	Eliminate harmful acidity	Municipal agricultural services	Soil mapping
13	Development of a project for intelligent energy system, networks and energy storage	Reducing the carbon footprint. Use of biomass from agriculture for application of circular type economy businesses.	NGO's, farmers, municipalities	Number of soft projects for system planning and their benefits. Number of investment projects for implementation.

14	Development of projects for diversification of biodiversity and the green infrastructure in the urban environment and reduction of air pollution.	Sustainable management of the affected settlements, protection of the soils in them and reduction of air pollution	Scientific organizations, NGO's, municipalities	Number of implemented projects for diversification of biodiversity and the green infrastructure in the urban environment and reduction of air pollution.

Soil salinization is a process in which the content of water-soluble salts and / or exchanged sodium in soils increases in quantities that negatively affect their properties, respectively their productive potential. In Bulgaria, about 35,500 ha of arable land affected by salinization processes have been registered, with 252 ha being salted with normal soda and chlorides. There is no evidence that the processes affect the administrative areas of the target study region. To permanently solve the problem, it is recommended to eliminate the conditions for secondary salinization (irrigation with highly mineralized groundwater, natural or anthropogenically caused deterioration of the conditions for drainage of intensively irrigated terrains, unfavorable and inconsistent with hydro-ameliorative and soil conditions, arable land structure) chemical melioration in areas with established permanently saline soils for displacement of exchanged Na (most often with gypsum, phosphogypsum, etc.).

The salinization will take place at different rates and to different degrees in soils of hydromorphic genesis on alluvial sediments of various compositions. The subject of their categorization as alkaline will also be the areas among the zonal ones with azonal conditions of humidification, created also in case of excessive irrigation..

№	Measure	Motives	Contractors	Indicators and monitoring
15	Creation of a methodology for unambiguous, by both countries, diagnosis of azonal salinization	Detection of secondary salinization, third damaging process	Regional inspections for environment and water	Analysis of the composition of irrigation and groundwater
16	Promoting climate change mitigation and adaptation	Public need of awareness raising and sustainable local economic	Scientific organizations, NGO's, municipalities	Number of implemented projects for climate change mitigation and adaptation,

	measures, risk prevention and disaster resilience.	development towards greening		risk prevention and disaster resilience.
17	Development of resource-efficient projects for transition to a circular economy, based on agricultural raw materials	Improving resource efficiency and turning green projects into a leading mechanism for local economic development	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented projects for resource efficient projects for transition to a circular economy, based on agricultural raw materials
18	Creating projects for digital communication and knowledge transfer and stimulating entrepreneurship, through online platforms and social media..	Optimizing the transfer of knowledge, entrepreneurial spirit, social sensitivity.	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented projects for digital communication and knowledge transfer and stimulation of entrepreneurship, through online platforms and social media.

Soil compaction is a process of deformation and increase of density and compactness, which reduces the aeration porosity and water permeability, increases the hardness and disrupts the soil structure. The process of compaction is related to tillage. The arable lands are affected by compaction of both the arable layer (up to 20-25 cm depth) and the subsoil layer (just below the arable layer). Unlike the arable layer, which is loosened every year, the compaction of the subsoil layer accumulates and over time a compact layer is formed. The ecological impact of compaction is expressed in the reduced aeration of the soil, associated with disturbance of water-air and heat balance in the soil, reduced access of oxygen to the roots, which leads to a decrease in root density and depth of the root zone. Soil compaction leads to a decrease in both its water permeability and the surface runoff potential, which increases the intensity of water erosion processes and the risk of floods..

The usage of a technique with increasing mass in tillage is a justified temporary solution. The created compaction is in discussion with the optimal ecological requirements of most agricultural crops, depending on the physical indicator for volume density - dry mass in undisturbed condition towards its

volume in the range of 1.1-1.3 (g / cm³). The formation of a joint position and the ratification of a joint decision by both parties will be a timely initiative.

№	Measure	Motives	Contractors	Indicators and monitoring
19	Creation and maintenance of a complex online GIS platform containing basic geo-databases	Prevention from compaction (fourth process under Art. 12) of the soil after using equipment with increasing mass	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented projects for Създаване и поддържане на комплексна онлайн ГИС платформа съдържаща основни гео-бази данни

Dehumidification, the reduction of the organic carbon / humus content, is monitored by the National Environmental Monitoring Systems in key areas and the different degree of organic matter (C) supply is categorized in g / kg of soil. In the sense of the Soil Act in the terminological apparatus to the Additional Provisions it is mentioned: ". "Soil organic matter" is a complex system of humic substances, proteins, amino acids, hydrocarbons, fatty acids, waxes, resins, lignin and others. The reduction of organic matter is a result of natural processes - dislocation and translocation of soil as a result of landscape features, the nature of vegetation, climate change; anthropogenic processes - disturbance of soil biodiversity; application of technologies of fertilization and tillage of soils, leading to increased mineralization and washing offs of organic matter; abandonment of arable soils; mineralization as a result of forest fires and burning of stubble. Soil organic matter is a huge potential source of carbon dioxide, which must be managed with extreme caution. In addition, the reduction of soil organic matter is accompanied by increased release of carbon dioxide into the atmosphere. Land use must be carefully chosen and steps taken to reduce greenhouse gas emissions into the atmosphere. The reduction of organic matter in soils in arable lands is mainly related to the removal of the surface soil layer due to water and wind erosion, oxidation of organic carbon due to high aeration during intensive tillage and degradation of soil structure during soil compaction. Water erosion of soil controls organic carbon stocks and their distribution in the landscape, which affects the carbon cycle, the content of carbon dioxide in the atmosphere and global warming. With the destruction of soil aggregates by raindrops, water erosion disrupts the physical retention of organic carbon in the process of aggregation of soil particles and releases the weakest bound fractions of organic carbon..

The total reserves of organic carbon for the territory of the country are estimated at about 1.3 Gt. Despite the lack of systematic observations, there is evidence of a sustained trend towards declining stocks of soil organic matter in arable land. It is necessary to develop and implement a program.

The exchange of data for maintaining and increasing soil fertility, demonstrations of good agricultural practices for soil organic matter conservation, integrated with soil protection measures against erosion and compaction, training programs for farmers and others will be positive examples of ensuring awareness of interested parties.

№	Measure	Motives	Contractors	Indicators and monitoring
20	Implementation of activities reducing the dehumidification of soil organic matter - the fifth process of soil damage	INeeded when mapping a soil association of often repetitive combinations of different varieties in a single territory	Municipal agricultural services	Provision of samples to certified laboratories to determine the fractional composition of soil organic matter, organic carbon or adequate humus content
21	Implementation of a project leading to categorization of the different degree of supply of organic matter (C) in g / kg of soil.	The exchange of data will ensure awareness of both parties	National environmental monitoring systems	Key sections

Optimization of land usage and reduction of health risk for the population.

2.2 Dissemination list of the action plan for crossborder soil protection;

The plan should be disseminated to the widest possible range of stakeholders. Their number can increase over time and to include the following organizations, not limiting itself to them:

1. The regional administrations and administrations of INTERREG-IPA regions between Bulgaria and Serbia.
2. All municipalities in the cross-border area between Bulgaria and Serbia.
3. All cooperatives of agricultural producers and plant growers.
4. All farmers keeping animals from the cross-border area between Bulgaria and Serbia.
5. All forest holdings from the cross-border region between Bulgaria and Serbia.
6. The regional offices of the National Agricultural Advisory Service in Bulgaria from the cross-border region between Bulgaria and Serbia.
7. "Danube Region" Basin Directorate

8. MoEW - Regional Inspectorates for Environmental Protection and Waters from the Transboundary Region between Bulgaria and Serbia.
9. All importers of agricultural machinery on the territory of the cross-border region between Bulgaria and Serbia.
10. All importers of plant protection products, fertilizers and other chemical products on the territory of the cross-border region between Bulgaria and Serbia.
11. All print and electronic media that are interested in the topic of soil protection in the cross-border area between Bulgaria and Serbia.
12. The web site of Boynitsa municipality - assignor of the project contract.
The most appropriate form is an electronic file containing all the information and all applications.

2.3 List of planned regular events to present the idea and results of the project

The dissemination of the results, is aimed at local and state authorities, farmers and the scientific community. It is imperative to organize public seminars in municipal and / or regional centers together with local authorities at the end of the project to present the results of the survey. The same will be reported at international scientific conferences.

In order to ensure the sustainability of the achieved results, it is appropriate to organize two events to ensure high public engagement and results.

1. Cross-border conference / round table / seminar to be dedicated to the border rivers, land usage in the end border lands, the ways of mapping, identification and unified designation of the soils between Bulgaria and Serbia;

2. Cross-border conference / round table / seminar to be dedicated to agricultural practices and soil risks, especially erosion, deflation and soil pollution.

The events may be accompanied or jointly held with already established fairs, exhibitions, forums and other events at which equipment, preparations, technologies and others that may be relevant to soil protection are presented.

3. LONG - TERM COOPERATION INITIATIVES

Soil pollution is a process of accumulation of harmful substances from a natural and / or anthropogenic source, whose behavior and concentrations cause damage to soil functions, regardless of whether the norms in force in the country are exceeded. Soil pollution leads to damage to soil functions and to pollution of surface and groundwater. The presence of contaminants exceeding certain levels leads

to negative consequences in the entire food chain, all types of ecosystems and other natural resources. The pollution can be from a local (point) source or it can be diffuse. Local pollution is usually associated with operating or closed mining and industrial enterprises, while in the diffuse pollution the main contribution is made by agricultural practices. The diffuse soil pollution in the recent years has been very weakly expressed, due to the restructuring of the economy and agriculture after 1990, the sharp decline in consumption of plant protection products and mineral fertilizers, the ban on the use of leaded petrol and increased environmental control over operating industrial productions. About 1/3 of the agricultural land contaminated with heavy metals and metalloids needs special monitoring. After 1994/1996, no statistically significant new areas contaminated with heavy metals and metalloids were registered.

The establishment of the content of a wide set of heavy metals and metalloids (As, Hg, Cd, Cu, Ni, Cr, Pb, Zn) in soils, not only as a result from ore mining and especially in the river valleys of Timok and Ogosta, as well as the database synchronization of the National Environmental Monitoring System, the "Soils" subsystem is also a priority activity.

№	Measure	Motives	Contractors	Indicators and monitoring
22	Synchronization of the database from the National Environmental Monitoring System, sub-system "Soils"	Establishment the content of heavy metals and metalloids (As, Hg, Cd, Cu, Ni, Cr, Pb, Zn) documenting of pollution - a sixth process	National environmental monitoring systems	Key sections
23.	Prevention and setting of threshold values for permissible concentration of harmful substances in the soil:	Criteria for conducting the policy on soil protection and management	MOEW; Scientific organizations.	Results of soil analysis, which determine the local level of concentration of harmful

	- precautionary concentrations - maximum permissible concentrations - intervention concentrations	of polluted lands. Certification of soils in terms of their ecological purity and creation of soil-geochemical maps		substances, causing unfavorable modifications. Reference background values for As, Cd, Cu, Cr, Ni, Pb, Zn; Ecotoxicological thresholds values for NO-EC(no observed effect concen-trations), MAR(max acceptable risk concentrations),MAR/100(negligible risk concentrations).

Soil sealing in recent years has been assessed as a significant, global threat to the complete destruction of soils. Sealed are soils, permanently built up for settlement construction, industrial and infrastructural construction, trade and transport sections, road, and railway network, etc. In the period 1990-2000, the separation of land for such needs was about 1000 km2 / year or 275,000 ha / day for the territory of the 27 member states. The percentage of permanently built-up areas is increased to 5.7% (from 176,000 to more than 186,000 km2). For Bulgaria, the permanently built-up areas represent about 5% of the total territory (over 560,000 ha), but there are areas where these areas are significantly higher. Over the last 20 years, Europe's built-up area has increased by 20%, while the population has increased by only 6%. In Bulgaria, the rate of growth of soil sealing is weaker, but at the same time, the total numbers of population decreases, ie. the sealed area per capita is growing at higher rates.

In the last few years, the process has become even more pronounced, due to the implemented infrastructure projects. Thus, the process of reducing soil resources and the balance of the land from the agricultural fund, called in the period of 1980-1998 "managed agricultural land", after that "areas with an agricultural purpose" turns out perhaps stable over time in the peripheral space for both countries and needs to be determined specifically.

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№	Measure	Motives	Contractors	Indicators and monitoring
224	Updating of the land balance and land use on both sides, including through online GIS solutions	Online information on real land usage and soil risks	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented land balance projects from the agricultural fund on both sides, including through online GIS solutions
225	Creating a project for sustainable land use, organic farming and attractive rural tourism - Type of farm food-hotel-attraction.	Need to expand knowledge about sustainability in organic farming, tourism and the circular economy. Stimulating local economic development.	NGO's, municipalities, companies, farmers	Number of implemented projects for sustainable land use, organic farming and attractive rural tourism - Type of farm food-hotel-attraction

In the functions of the "Geoprotection and Public Works" Directorate at the Ministry of Regional Development and Public Works is to: "Creates and maintains a register of landslide areas in the country… .. and to perform coordination between the various departments for limitation of the landslides on the territory of the Republic of Bulgaria…". Again, the synchronization with the activities and results from the reciprocal Ministry of Serbia will catalogues the number of periodically active, potential, and stabilized landslides.

№	Measure	Motives	Contractors	Indicators and monitoring
226	Cataloging the number of periodically active, potential and of the stabilized landslides	Synchronization of reciprocal functions of Institutions maintaining the registers	From the Bulgarian side Directorate "Geo Protection and Public Works" at the Ministry of Regional	Coordination between the different departments monitoring different polygons with the

			Development and Public Works	aim to limit the landslides

Keeping of the elevated groundwater level hydraulically connected to river levels swamps the soils formed on the terraces of these rivers is a subject to map making and mapping within the meaning of the Crossborder Soil Protection Action Plan..

№	Measure	Motives	Contractors	Indicators and monitoring
27	Creation of an interactive GIS of the Cross-Border Action Plan for Soil Protection and Swamp Control.	Establishes in the river terraces the increased level of groundwater, hydraulically connected with the river levels	Municipal agricultural services	Observations and decisions for land usage change

The limitation of soil degradation processes in agricultural lands is possible, through the application of agricultural practices, including a complex of measures with soil protection and runoff regulatory action for integrated protection of soils and waters, specific to given soil-climatic and topographic conditions with the aim of improving soil fertility:

№	Measure	Motives	Contractors	Indicators and monitoring
228.	Improving soil fertility: - increasing the stocks of soil organic matter	Studies of the mechanisms for achieving and maintaining soil	Agricultural holdings; Forestry holdings;	Content of Total organic carbon, Content of Total nitrogen, Content of Total phosphorus,

	- mineral fertilization - organic fertilization - ecological cultivation of plants -usage of crop residues from field crop rotations, instead of their direct burning in the field - improvement of the soil biodiversity -usage of machines and technologies for tillage with minimal pressure on the soil surface (loosening, plowing, disking) -increasing the infiltration capability of the soil - maintenance and	fertility, integrated with the measures for protection of soils from erosion and compaction	Scientific organizations.	Soil reaction, Mechanical composition, Volume density, Soil moisture regime, Assimilable water supply of plants, Degree of compaction, Content of Aerational pores at water potential 5 kPa, Hardness, Water conductivity, Direct assessment of the compaction of the soil horizons, based on visual assessment of soil structure, Productivity Index (PI) proposed by Nail (cited in Pierce et al., 1983), is specifically designed to assess root growth and water stress. It was included by Larson and Pierce (1994) as a quantitative

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	restoration of soil structure			indicator for soil monitoring purposes.

In addition, we can point out the following long-term initiatives:

Financial motivational incentives to clean up soil pollution.

Quantitative determination of the permissible content of certain elements in fertilizers.

Regulatory regime of the impact of pesticides.

Inventory of potentially dangerous sites with uncontrolled tanks and reservoirs, stored "temporarily", storing dangerous substances.

Transferring the funds that countries set aside annually to overcome the damage from the negative soil processes towards spending for preventive activities.

Boundment with developed methodologies for preliminary risk assessment of river valleys.

Correspondence with National Disaster and Accident Protection Programs.

Supporting the implementation of Strategies for regional development and linking with the Municipal Rural Development Plans 2014-2020г.

The results will contribute to more efficient use of the natural environment and will have a sparing impact on the environment.

3.1 Membership Application to the European Soil and Land Alliance (ESLA)

See Annex 2.

3.2 Text of the Manifesto of the Soil and Land Alliance

MANIFESTO FOR THE SOIL & LAND ALLIANCE OF EUROPEAN CITIES AND TOWNS

Preamble

Soils, together with air and water, are the central basis of life on earth. The characteristics and functions of soils are very different regarding their site and composition. Increase of buildings and sealing by settlement and transport areas as well as by the continuing exploitation of the soil and land resources and the overuse, soils are regionally endangered and highly endangered globally, too, by the sum, the extent and the spreading of all damages. The far-reaching consequences of land consumption and the degradation as well as the fact of irretrievability and very slow process of soil formation correspond to the impacts of global climate change and the loss of biodiversity. In addition, there is a close linkage of soil change to climate change. There is an urgent need of action seen at the global level. All countries have to contribute to a sustainable improvement of soils and land on a national, regional and local level. In this context the cities and municipalities (local authorities) are especially important as they are directly related to the local land and nearest to its owners. It is their task to improve soil awareness, to protect the natural soil functions as well as to follow social justice. They have instruments of spatial planning and planning control law, which serve to foster and realise a sustainable use of soils and land in municipalities. We, the local authorities, are conscious of these questions and issues and at the same time of the chances of a sustainable use of soils and land. Together we will take the initiative to work on the solutions of the problems. We, as local authorities, take the chance to realise this in an uniting Europe through the European Soil & Land Alliance.

1. The responsibility of the cities and towns

We, the local authorities, assume responsibility for a sustainable soil policy in our areas. This includes the ecological side by improving the natural soil functions as well as an economically and socially just soil and land use. For that we want to • exploit our scope of action for a sustainable development, • set a good example as local authorities, • integrate all stakeholders according to the Agenda 21 into the planning and management of urban and other local areas and constitute a participation process in the solution of the specific urban and rural soil and land problems, • contribute to public awareness for a sustainable use of soils and land. We acknowledge that the problems of soil and land not only have local

and regional significance, but that we furthermore - in the prospect of global responsibility - cause global effects on soils in other parts of the world by our life style.

2. Objectives of the Soil & Land Alliance

Our overriding objective is the sustainable use of all types of soils for the conservation and improvement of all soil functions as well as the land resources and the natural and cultural heritage for the present and future generations and the socially just and fair use of soils and land. The Soil & Land Alliance of European Cities and Towns is in agreement with the objectives of the Tutzing proposal for a "Convention on Sustainable Use of Soils" (Soil Convention) and the "UN-Convention to Combat Desertification".

3. Guidelines and strategies

Our overriding objective will be especially realised by the following guidelines and strategies.

3.1. We foster our independence and identity by a responsible local soil and land policy. For that • we raise awareness for the chances but also the problems of a sustainable use of soils, • we register land consumption and re-usable fallow land, • we make every effort to reverse the trend towards land consumption and soil degradation, • we define priority objectives for sustainable development and pursue actively an economical use of soil and land resources, • we support educational measures concerning soils and land use, • we inform the public about the above-mentioned objectives and strategies to be taken and promote public awareness.

3.2. We promote qualitative growth or stabilisation in responsibility for environment, society and culture. For that

• we restrict soil and land consumption, direct the settlements development inwards and promote the quality of the settlement management,

• we register and redevelop dangerous old waste deposits and prepare the land for an appropriate reuse,

• we take questions of social justice and gender fairness into consideration when using soils and land,

• we employ intensified efforts to conserve and improve soil fertility and soil formation processes, whereby special importance is attached to soil care and the unsealing of areas,

• we take measures for soil conservation, soil improvement and soil regeneration, safeguarding especially valuable soils, protect soils from erosion and compaction and reduce pollution,

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• we maintain the function of soil as carbon (and nitrogen) storage taking into account of the major natural material cycles,

• we take measures for the improvement of the microclimate and the water balance, thus contributing to the enhancement of the quality of life in the settlement area,

• we promote the marketing of regionally grown products,

• we take care of the natural and cultural heritage,

• we promote the ecological networks of the biosphere.

3.3. We trust in the innovative empowerment of co-operation in a spirit of partnership.

For that

• we co-ordinate soil-improving and spatially relevant projects with regard to an optimal expediency and sustainability,

• we support the realisation of the objectives of the European Spatial Development Perspective (ESDP) on sustainable spatial development and soil protection,

• we include the concerns of neighbouring municipalities and regions,

• we improve the relation between urban and rural areas mutual coordination,

• we work together as partners across borders.

3.4. We support the sustainable use of soils by means of spatial planning and planning control law instruments. For that

• we keep and enhance the specific character and quality of the soils and land when used or intruded and upgrade their value,

• we use soils through effective assignment for diverse uses as well as differentiated rules for their use, so that soils, nature and landscape can develop optimally,

• we include the requests of the population and the interests of the land users and land owners and take them into consideration when realising measures,

• we contribute to the specification and implementation of additional instruments according to the market economy as rules for a sustainable use of soils and land.

4. Benefits of a Soil & Land Alliance

The benefit of a Soil & Land Alliance for Cities and Towns is first of all to declare the cities' and municipality's support for having a share of the responsibility for a sustainable use of soils and land on a local level. The sustainable use of soils and land improves soil fertility, microclimate, and water balance,

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may lead to enormous cost savings, especially with regard to the extension and maintanance of infrastructure, saves resources for future development and future generations, improves the full use of existing areas and the stabilisation of the settlement density, revives public spaces and, on the whole, contributes to an improvement of the quality of life and the image of the municipality. The member cities and municipalities of the Soil & Land Alliance profit from the advantages of the cooperation and the exchange of experiences with other cities and towns.

5. Global responsibility and partnership

Soil problems are specific for local conditions and sites and have to be solved primarily at the local level. At the same time they also have an international dimension, that comprises the ecological as well as the social, economical and legal aspects. In many countries the question of the availability of soils, the rights for land use, and the rights of indigenous nations on their traditional territories is prone to conflicts. Especially in the arid and rainforest regions of the south serious problems arose through soil and land degradation. We contribute to these problems by our way of economy and way of life, as we clearly claim more land than is available and in use in our countries.We see partnerships with indigenous nations and other local communities in all parts of the world, e.g. local authorities and organisations, as a very important objective of the Soil and Land Alliance. We want to take into consideration the soil problems in our partnerships and try to use our potentials to contribute to problem solving, especially in areas which are strongly affected by soil and land degradation.

The international work of the Soil & Land Alliance is specially based on the "Convention 169" of the International Labour Organisation (ILO). It grants the indigenous tribes and people rights on their land and their resources, their own way of life, culture and language.

6. The relation between Soil & Land Alliance and Climate Alliance

There is a close and direct relationship between the world-wide soil and land degradation and the global climate change. The soil bears all resources and stores materials that influence the climate. Climate changes have a far-reaching effect on the condition of soils. Soil & Land Alliance and Climate Alliance see themselves as complementary initiatives under the overriding objective of a sustainable development. They focus jointly on responsible local action in cities and municipalities and the inclusion of the northsouth dimension in municipal action.

7. Commitment of the members of the Soil & Land Alliance

As member cities and towns we commit ourselves, fully using our responsibility and competence to establish the objectives of the Soil & Land Alliance and to decide and realise the appropriate measures

according to its guidelines. We are determined to initiate a reversal of the trend in the still growing land consumption and soil degradation and to be active in continuing the improvement of the situation of soils and land. For the solution of these tasks we include all stakeholders according to the Agenda 21. We commit ourselves to regular reporting, fixing appropriate targets, and controlling the success of our soil policy. In addition we foster an open exchange of information and experiences with the member local authorities within our country and internationally, and develop joint projects and standards.

We ask the higher political levels to support a sustainable use of land and soils and to set the needed framework for the realisation of the objectives of the manifesto. We regard all associations, public institutions and business actors, which support these guidelines, obligations and measures of the Soil & Land Alliance, as our allies.

Bolzano on 24 October 2000

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1. **Annex 1 - Short term cooperation initiatives**

№	Measure	Motives	Contractors	Indicators and monitoring
1	Integrating scientific ideas, knowledge and experience in the field of pedology	Using the analogy method when making adequate decisions	Expert lecturers.	In-depth knowledge of natural conditions and resources in both countries
2.	Overcoming the diversification in the spatial study around the state border between Bulgaria and Serbia	Intensification of interaction between state and municipal bodies	Universities, Institutes / organizations, based on national legislation	Monitoring sites with a set of sensors for research and analysis of soil interactions with climatic, geomorphological and partly hydrological processes
3.	Belonging of the administrative units from the eligible region to cross-border river basins	Basis for creating integrated geographical patterns and interstate cartographic images.	National and regional agencies / services, maintaining cadastral maps.	Cadastral sheets, defining the way of permanent land usage
4.	Compilation of a methodology for cartographic attributes for presentation of thematic content areals, uninterrupted from the state border	Overcoming the uniqueness of cartographic products created by Bulgaria and Serbia, unsynchronized in the cross-border area	Experts from the Faculties of Geography and Geographical Institutes of Serbia and Bulgaria	Preparation of reports, analyzes and studies of the natural potential
5.	Improving the methodology and nomenclature of used relief elements in the valleys of the six river coasts	Compilation of a unified Serbian-Bulgarian legend of a Geomorphological map	Experts - Geomorphologists	Referencing created maps at different scales. Mandatory condition for linking the areas of soil varieties
6.	Compilation of a methodology for synchronization of results from geological mapping, completed in both countries	Correct positioning of the leading soil formation factor	Concessions and Geology Service at the Ministry of Energy and Geological Survey of Serbia,	Linking the geological heritage with mapping
7.	Achieving similarity of engineering-geological conditions and developed geodynamics in cross-border space	Prioritize geological hazards in specific areas	Experts from the Section "Geological Hazards and Risks", GI of BAS and from a reciprocal Serbian Scientific Institute	Preparation of communication strategy

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№	Measure	Motives	Contractors	Indicators and monitoring
8.	Optimization of the visualization and mapping of the spatial structures of the habitats and the species in the Green Belt of Europe - the border zone between Serbia and Bulgaria	Establishing the potential connections between the protected areas "Emerald" in Serbia, continuation of the ecological network "Natura 2000" outside the EU borders, with the existing sites NATURA 2000 in Bulgaria	Experts biogeographers, botanists and ecologists	Establish the full overlapping, gaps and missing network connections at the border. Recommendation of the criteria defining NATURA 2000 protected areas for leading corrective among the factors, indicators for diagnosing soils with forest soilformation
9.	Synchronization leading to unambiguous compliance with the soil classification standards of the third edition of the World Reference Base for Soil Resources (WRBSR - updated in 2015), approved by the International Union of Soil Science (IUSS).	Linking soilformation types in Bulgaria and Serbia with the positioning to flat, foot, slightly sloping, sloping and dissected mountain terrains in the six river basins	Experts pedologists / soil scientists	Emphasis on the specificity of soil formation in order to form grounds for the establishment of crossborder soil areas in the peripheral territory of Serbia and Bulgaria.
10	Assessing the factors and risk of surface water and wind erosion of the soil, according to the methodology developed by the US Department of Agriculture, based on research in the critical area "(SoilCritZone) and at the municipal level.	The methodological bases, adapted and validated for Bulgarian conditions, are a motive for synchronization with scientific results obtained on the Serbian territory.	A team of scientists from the Soil Erosion Section of IPAZR "N. Pushkarov"	Based on a mathematical expression of a forecast model called the Universal Soil Loss Equation (USLE) and the risk of wind erosion of the soil
11	Land usage planning in accordance with the suitability of the land for effective anti-erosion land usage depending on a number of limiting factors and threats	delineation of transboundary soil-erosion areas in the peripheral territory of Serbia and Bulgaria.	A team of scientists from the Soil Erosion Section of IPAZR "N. Pushkarov"	Interpretation of the content of the created within the general thematic maps of rain erosion, susceptibility to soil erosion, the potential risk of areal water erosion, wind erosion, soil susceptibility

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№	Measure	Motives	Contractors	Indicators and monitoring
				to deflation and the significant risk of wind erosion

1.1 List of soil protection measures proposed during the project activities

№	Measure	Motives	Contractors	Indicators and monitoring
1	Improving the awareness about the risks, during soil protection	Necessary elements for anti-erosion design against the first, according to the Bulgarian legislation, soil damaging process - erosion	Regional inspections for the environment and waters	Presentation of data on the different types of risk at the public events of the project
2	Presentation of information on the importance for the spatial distribution of slopes on inclines in municipalities and along rivers	Estimation of areas and those with an incline above 15 ° almost unsuitable for the development of crop production	The team generating an up-to-date geo-database	Presentation of data on the different types of risk at the public events of the project
3	Improving the awareness for construction of reclamation-technical and hydro-technical facilities	Strengthen the banks and bottoms of erosion forms	In the functions of the Directorate "Geoprotection and Public Works" at the Ministry of Regional Development and Public Works and the relevant Serbian institution	Differentiated application depending on natural climatic and economic conditions
4	Improving the awareness of the benefits of grassing and / or forest belts in erosion-hazardous areas	It is applied to washed / poor / eroded soils	Municipal agricultural services	Experimental sites for various demanding crops with minimal participation of trench

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№	Measure	Motives	Contractors	Indicators and monitoring
5.	Giving guidelines for the application of various grassing practices: complete grassing, grass buffer strips, belt farming, terracing, buffer strips and belts	Reduction of the average annual soil losses from erosion for the respective soil type. Determining a variant of measures with the greatest economic effect	Agricultural holdings; Forestry holdings; Scientific organizations; Municipalities.	Amount of liquid and solid outflow; Export of foodstuffs; Soil protection capabilities; Limitation of erosion processes
6.	Improving awareness of the application of the anti-erosion effect of annual crops	Establishing the different influence during the different phases of vegetation	Regional inspections for the environment and waters	Results from runoff sites for monitoring erosion processes
7.	Improving awareness, diversification of agricultural technique over various slightly sloping terrains	Compliance with the water retention capacity of micro-depressions with an incline of up to 20 and micro-rises in the relief with an incline of 30 - 40	Municipal agricultural services	Plans in scale 1:5000 и 1:1000 with horizontals through 0,5 и 1,0 m
8	Improving awareness by creating anti-erosion wall terraces and ditch-walls	Protection of soils at an incline of 60 - 80 depending on their use	Municipal agricultural services	Plan, soil and soil erosion-on the map
9	Improving awareness by creating anti-erosion stepped shaped terraces	Regulation of surface water runoff at> 100	Municipal agricultural services	Plan, soil and soil erosion-on the map
10	Improving awareness of harmonization and implementation of agroforestry protection standards on both sides	Correlation distinguishing the type, location and purpose of wind protection equipment	Territorial divisions in the Regional Directorates of Forestry and the corresponding ones on the part of Serbia	Mapped areas by groups of forests and functions (forest fund, provided forest fund, forest meadows and forests in the agricultural fund)
11	Categorization of buffer against chemical contamination	Acidification is the second regulated by Art. 12 of the Bulgarian Soils Act, a process damaging the soils	Regional inspections for the environment and waters	Systematizing the results of good practices in growing acid-resistant agricultural crops
12	Agrotechnological regulation of water-air regime of planosols	Elimination of harmful acidity	Municipal agricultural services	Creation of soil maps

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№	Measure	Motives	Contractors	Indicators and monitoring
13	Development of a project for intelligent energy system, networks and energy storage	Reducing the carbon footprint. Use of biomass from agriculture for application of circular type economy businesses.	NGO's, farmers, municipalities	Number of soft projects for system planning and their benefits. Number of investment projects for implementation.
14	Development of projects for diversification of biodiversity and the green infrastructure in the urban environment and reduction of air pollution.	Sustainable management of the affected settlements, protection of the soils in them and reduction of air pollution	Scientific organizations, NGO's, municipalities	Number of implemented projects for diversification of biodiversity and the green infrastructure in the urban environment and reduction of air pollution.
15	Unambiguous, from both countries, diagnosis of azonal salinization	Establish secondary salinization, the third soil-damaging process	Regional inspections for the environment and waters	Analysis of the composition of irrigation and ground waters
16	Promoting climate change mitigation and adaptation measures, risk prevention and disaster resilience.	Public need of awareness raising and sustainable local economic development towards greening	Scientific organizations, NGO's, municipalities	Number of implemented projects for climate change mitigation and adaptation, risk prevention and disaster resilience.
17	Development of resource-efficient projects for transition to a circular economy, based on agricultural raw materials	Improving resource efficiency and turning green projects into a leading mechanism for local economic development	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented projects for resource efficient projects for transition to a circular economy, based on agricultural raw materials
18	Creating projects for digital communication and knowledge transfer and stimulating entrepreneurship, through online platforms and social media..	Optimizing the transfer of knowledge, entrepreneurial spirit, social sensitivity.	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented projects for digital communication and knowledge transfer and stimulation of entrepreneurship, through online platforms and social media.
19	Creation and maintenance of a complex online GIS platform containing basic geo-databases	GIS is an online tool, that is easily distributed through social media and mobile applications. It	Creation and maintenance of a complex online GIS platform containing basic geo-databases	GIS is an online tool, that is easily distributed through social media and mobile applications. It allows access

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№	Measure	Motives	Contractors	Indicators and monitoring
		allows access levels and can fill significant information gaps.		levels and can fill significant information gaps.
20	Dehumidification of soil organic matter - the fifth process of soil damage	Necessary for mapping a soil association of often repetitive combinations of different varieties in one territory	Municipal agricultural services	Provision of samples to certified laboratories to determine the fractional composition of soil organic matter, organic carbon or adequate humus content
21	Categorization of the different degree of organic matter (C) supply in g / kg of soil.	The exchange of data will ensure awareness of both countries	National environmental monitoring systems	Key sections
22	Synchronization of the database from the National Environmental Monitoring System, sub-system "Soils"	Determining the content of heavy metals and metalloids (As, Hg, Cd, Cu, Ni, Cr, Pb, Zn) documenting pollution - the sixth process	National environmental monitoring systems	Key sections
23.	Prevention and setting of threshold values for permissible concentration of harmful substances in the soil: - precautionary concentrations - maximum permissible concentrations - intervention concentrations	Criteria for conducting the policy on soil protection and management of polluted lands. Certification of soils in relation to their ecological purity and creation of soil-geochemical maps	MOEW; Scientific organizations	Results of the soil analysis, which determine the local level of concentration of harmful substances causing unfavourable changes. Reference background values for As, Cd, Cu, Cr, Ni, Pb, Zn; Ecotoxicological thresholds for NO-EC(no observed effect concen-trations), MAR(max acceptable risk concentrations),MAR/100(negligible risk concentrations).

№	Measure	Motives	Contractors	Indicators and monitoring
24	Updating of the land balance and land use on both sides, including through online GIS solutions	Online information on real land usage and soil risks	Scientific organizations, NGO's, municipalities, companies, farmers	Number of implemented land balance projects from the agricultural fund on both sides, including through online GIS solutions
25	Creating a project for sustainable land use, organic farming and attractive rural tourism - Type of farm food-hotel-attraction.	Need to expand knowledge about sustainability in organic farming, tourism and the circular economy. Stimulating local economic development.	NGO's, municipalities, companies, farmers	Creating a project for sustainable land use, organic farming and attractive rural tourism - Type of farm food-hotel-attraction.
26	Cataloging the number of periodically active, potential and stabilized landslides	Synchronization of reciprocal functions of the Institutions maintaining the registers	On the Bulgarian side, the Geoprotection and Public Works Directorate at the Ministry of Regional Development and Public Works	Coordination between the different departments monitoring different landfills in order to limit landslides
27	The object of mapping and map making in the sense of the Cross-Border Action Plan for Soil Protection is also the swamping.	Establishes in the river terraces the increased level of groundwater, hydraulically connected with the river levels	Municipal agricultural services	Observations and decisions for land usage change
28.	Creating an online platform for training and awareness of soil fertility and their protection	-increasing the stocks of soil organic matter -mineral fertilization -organic fertilization -ecological cultivation of plants -usage of crop residues from field crop rotations, instead of their direct combustion in the field	Agricultural holdings; Forestry holdings; Scientific organizations.	Number of implemented projects for an online platform for training and awareness of soil fertility and their protection

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№	Measure	Motives	Contractors	Indicators and monitoring
		-improvement of soil biodiversity -use of machines and technologies for tillage with minimal pressure on the soil surface (loosening, plowing, disking) -increasing the infiltration capacity of the soil -maintenance and restoration of soil structure. Total organic carbon content, Total nitrogen content, Total phosphorus content, Soil reaction, Mechanical composition, Volume density, Soil moisture regime, Assimilable water supply of plants, Degree of compaction, Aeration pore content at water potential 5 kPa , Hardness, Water Conductivity, Direct Estimation of Soil Horizon Density Based on Visual Assessment of Soil Structure, Productivity Index (PI) proposed by Nail (cited in Pierce et al., 1983), designed specifically to		

№	Measure	Motives	Contractors	Indicators and monitoring
		assess root growth and water stress. It was included by Larson and Pierce (1994) as a quantitative indicator for soil monitoring purposes.		

ANNEX 2

MEMBERSHIP APPLICATION TO THE EUROPEAN LAND AND SOIL ALLIANCE

http://www.bodenbuendnis.org/fileadmin/user_upload/soil-alliance/Publikationen/Statuten_Manifest___Co/Declaration_of_Membership_ELSA_-_associated_members.pdf

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