



Monitoring of degraded soil. National standards for good agricultural and environmental condition of the land

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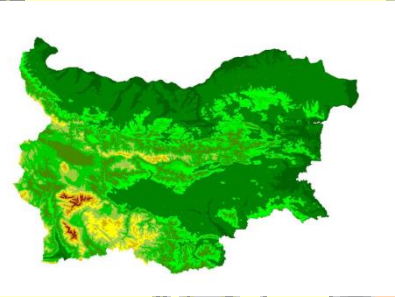
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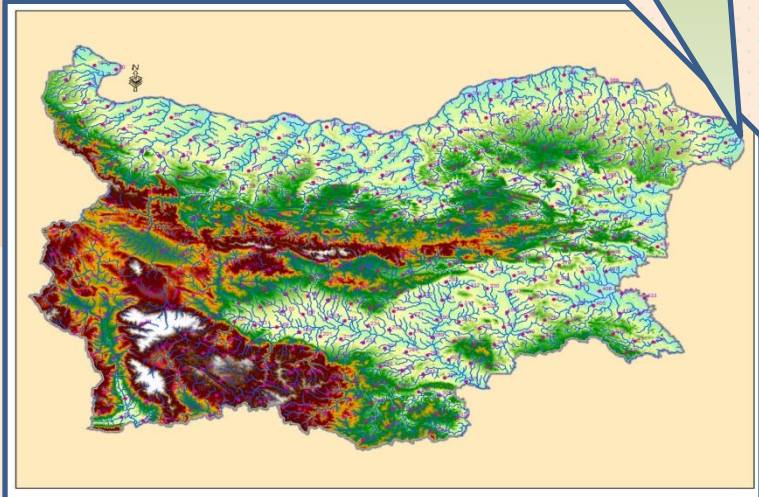
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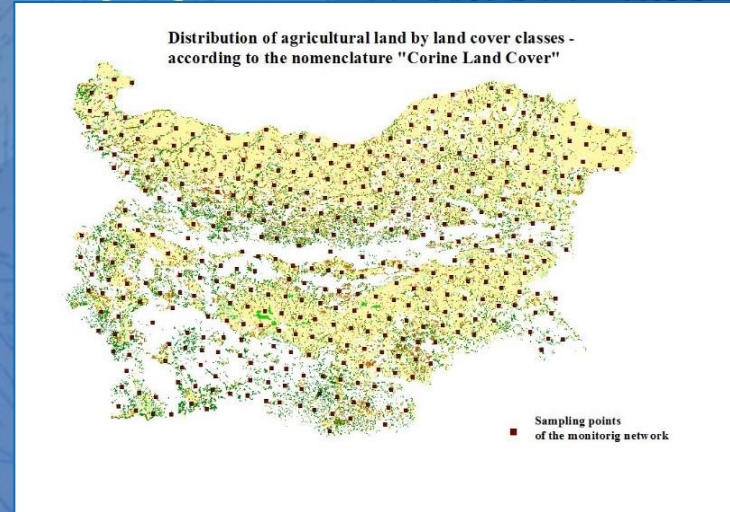
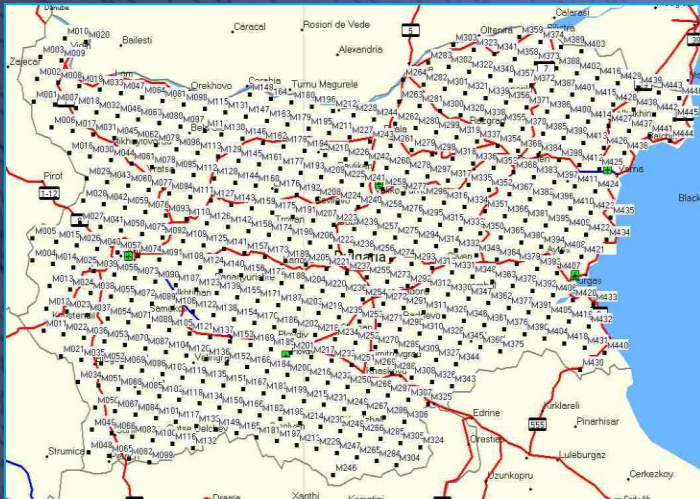


Bulgaria
area- 111 000 km²,
cultivated land-
3 800 000 ha,





After 2003 it was adopted a uniform network for environmental monitoring of soil. Proposed were three levels of The survey: basic and specialized second and third levels aimed to study of chemical degradation and erosion studies.



Basic level- grid 16x16 km, repeat each 5 years. Composed of 446 points, reduced in 2010 to 397 points. Indicators- ISO standards.

Result- Law for soil protection (2008); different Ordinance- for ecological soil monitoring- basic level (2010), Ordinance on the content of harmful substances (2008) etc.

Under contract with the Ministry of Environment (2013) the point information from the monitoring network was specified. Monitored points were identified by a number of taxonomic, chemical, physico- chemical and physical investigations.

1. Location

PUNCT_ID	77	RIEW	VRATZA	
Coordinates	X	23.5823	Y	43.1338
Elevation	1029	Exposition	NE	
Settlement area	v.Chelopek	Date	18 10 2012	
EKATIE	80311	Municipality	VRATSA	

2. Classification

National classification			
Carbonated chemozem soils			
WRB2006 classification			
Epileptic Cambisol (Calcaric, Humic, Skeletic)			
Diagnostic horizon	Cambic horizon		
Reference group	Cambisol		
Classifier	Epileptic, Calcaric, Humic, Skeletic		

FAO Classification

Calcaric Cambisol			
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3. Climate data

Precipitation /mm/	Precipitation Min	39	Precipitation Max	110
Air temperature /t°C/	Air Temperature Min	5	Air Temperature Max	14

4. Vegetation

Vegetation type	Mixed vegetation
Land Use	Pastures

5. Soil genesis

Bedrocks	Carbonated rocks
Erosion	non eroded

6. Soil morphology

Composition surface	light clay
Stony	light stony

Bedrocks depth /cm/	missing						
Groundwater level /cm/	missing						

Horizon ID	1	2	3	4	5	6	7
Horizon Name	Ahk	ACk1	ACk2	Rk			
Depth bottom level /cm/	10	19	45	0	0	0	0
Border type	2	2					
Carbonates	Effervescence	3	3	3			
	Forms	0	0				
Moisture	1	1	1				
Gleyzation	0	0	0	0	0	0	0
Density	4	4	4				
Cutans	0						
Munsell	10/YR/4/3	10/YR/ 4/4	10/ YR/ 4/4				
Inclusions	132, 253	120, 251	274				

7. Soil Chemistry

Horizon ID	1	2	3	4	5	6	7
Horizon Name	Ahk	ACk1	ACk2	Rk			
pH/H2O/	6,2	5,7	6,8				
Carbonates /% /	0,19	0,34	0,42				
Carbon /% /	3,79	1,96	1,68				
Humus /% /	6,53	3,38	2,9				
Cation capacity /cmol/kg/	43,07	38,5	43,95				
Saturation /% /	99,84	98,85	99,89				
Ex_ acidity /cmol/kg/	0,07	0,4	0,05	0,00	0,00	0,00	
Conductance /dS/m/	<4,00	<4,0	<4,0				
Phosphor /in Na2C2O3, g/kg/	0	0	0	0	0	0	

8. Soil physics

Horizon Name	Ahk	ACk1	ACk2	Rk			
Volume Density /g/cm3/	0	0	0	0	0	0	
Sum(sand, silt and clay) /% /	100,01	100,00	100,00	0,00	0,00	0,00	0,00
Distribution of fractions /% /	2-0,2	1,23	0,94	12,21	0,00	0,00	0,00
	0,2-0,02	35,56	16,37	15,75	0,00	0,00	0,00
	0,02-0,002	33,35	41,99	30,46	0,00	0,00	0,00
	<0,002	29,87	40,70	41,58	0,00	0,00	0,00

Prepared by:



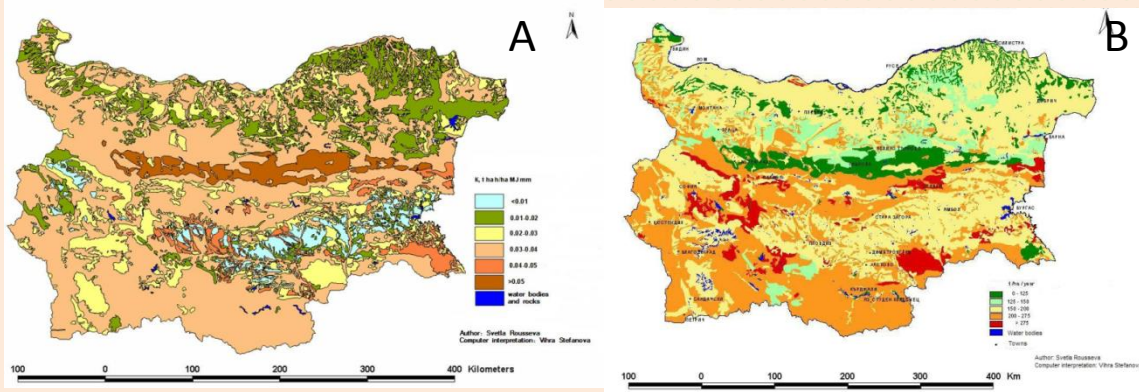
EROSION

Potentially affects 5 838 000 ha. It is about 50% of the country area. Risk of wind erosion concerns 1.35 million hectares.

Based on models, which were validated and adapted for BG conditions for predicting erosion factors and rate, geographical information systems for water and wind erosion, as well as risk assessment have been developed.

AGRI-ENVIRONMENTAL PAYMENTS FOR WATER SOIL EROSION PROTECTION

Distribution of the territory of Bulgaria according to classes of soil susceptibility to water (A) and wind (B) erosion



- **ORDINANCE NO. 7 FOR IMPLEMENTATION OF MEASURE 10 "AGRI-ENVIRONMENT AND CLIMATE" OF THE RURAL DEVELOPMENT PROGRAMME FOR THE PERIOD 2014-2020.**

Section V. Soil erosion control - the farmer applied one of the following activities:

1. Conversion of arable lands in permanent grassland - 315 €/ha;
2. Carry out erosion control measures in vineyards and orchards: a) by buffer strips on the vineyards and orchards – 156 €/ha; b) building and maintaining furrows across the slope – 142 €/ha;
3. Control erosion measures in arable land: a) creation and maintenance of buffer strips (the width of the strips is of 4 to 8 m), be drawn across the terrain of distance 20-80 m depending on the slope, soil type and other factors. Depending on the distance between them and their width they take 10-30% of the arable area – 40 €/ha; b) contour strip cropping - strips width (30-100 m) -38.2 €/ha.

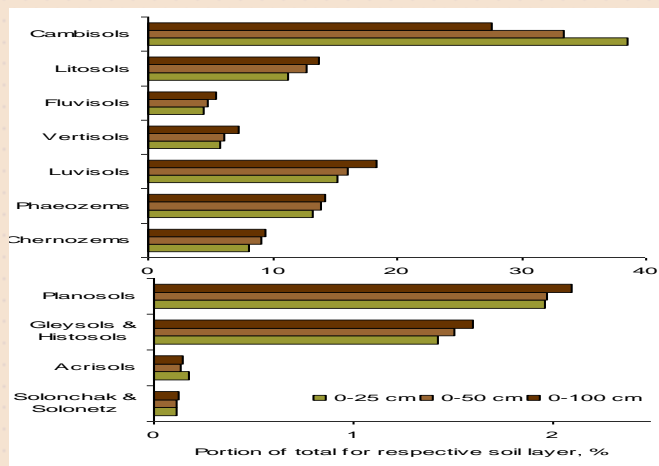
- **ORDINANCE NO. 2 FOR THE TERMS AND CONDITIONS FOR THE PROVISION OF FINANCIAL ASSISTANCE UNDER THE NATIONAL PROGRAMME FOR THE PROMOTION OF THE WINE SECTOR FOR THE PERIOD 2014-2018.**

Art. 5. (1); 2 g) construction of soil erosion practices for:

- ✓ building of furrows and/or collectors, grassed or not) – 4127 €/ha;
- ✓ construction of underground collectors for drainage (drainage) - 4127 €/ha;
- ✓ construction of wells and channels for drainage (construction, cleaning and shaping of the trenches for the pipes, drainage trenches, laying of drainage pipes) - 4127 €/h;
- ✓ the construction or reconstruction of terraces - from 8125 €/ha to 9040 €/ha depending on the slope of the terraces.

DECLINE IN SOIL ORGANIC MATTER

Percentage distribution of organic carbon reserves according to the major soil groups and soil layers

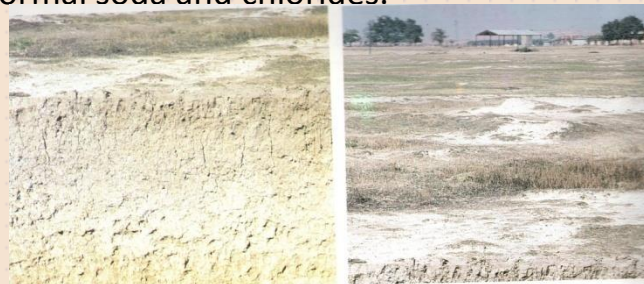
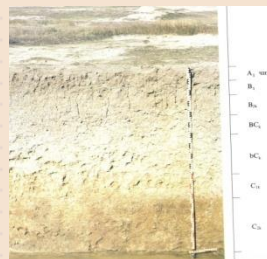


- Despite the absence of systematic observations, there are data indicating a permanent tendency towards decline of the soil organic matter in cultivated lands.

- Development and application of specialized programs is necessary to maintain and increase soil fertility focusing on good agricultural practices for maintaining the soil organic matter, integrated with the measures for soil erosion and soil compaction control, etc.

SALINIZATION

Process of increase the content of water soluble salts and/or exchangeable sodium in the soils at amounts influencing negatively the soil properties and their productive potential. The area of agricultural land affected by this process is estimated at 35 000ha including 252 ha, salted by normal soda and chlorides.



- Permanent solution of the problem needs elimination of the conditions for secondary salinization (irrigation with highly-mineralized groundwater, natural or anthropogenic deterioration of drainage conditions in intensively irrigated croplands, unsuitable landuse structure, which is not consistent with the soil and the hydro-ameliorative conditions) as well as chemical amelioration in areas with established permanently salinized soils aiming at displacement of the exchangeable sodium (by gypsum, phosphor-gypsum etc.).

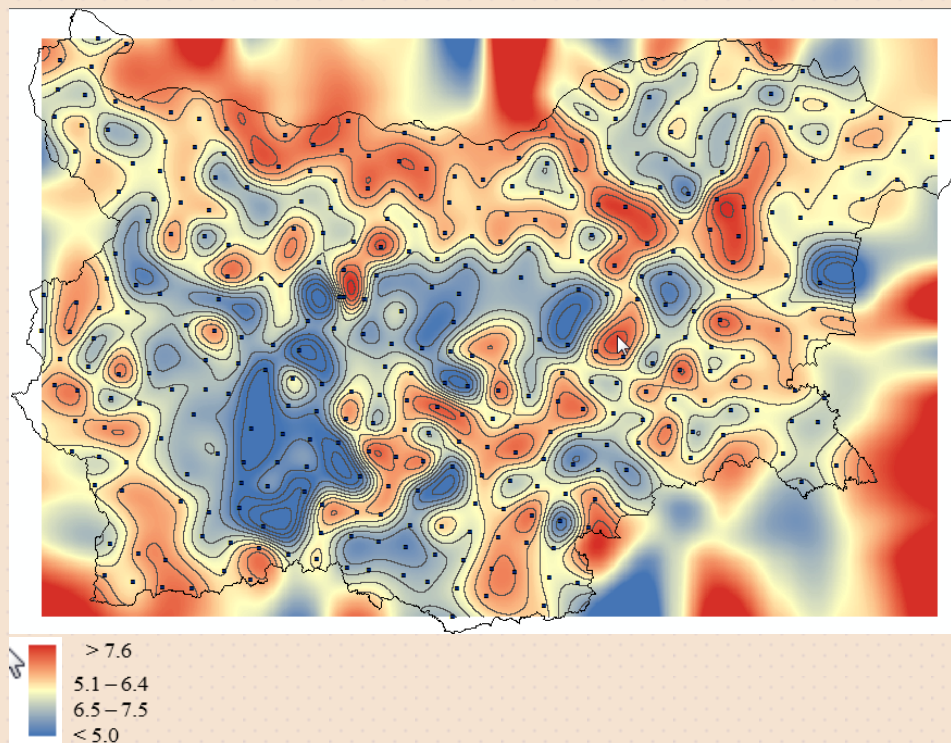
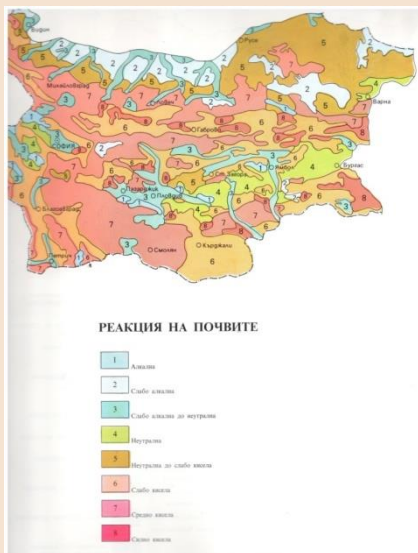
LOSS OF BIODIVERSITY

There are no systematic observations on the loss of biodiversity in the agricultural lands.

- The loss of biodiversity can be limited by reducing the intensity of the soil degradation processes, the landscape changes leading to loss of habitat of the biological species and the arson of the stables.
- The plant remains in the field crop rotations can be used either in the agro-technique of the field crops by ploughing them into the ground, composting, mulching, etc, or as a litter, fodder, briquettes, direct burning in special ovens, raw material for industrial productions, etc.

ACIDIFICATION

Potentially acid soils
(based on the soil type)



Acid soils-
about 1 500 000 ha

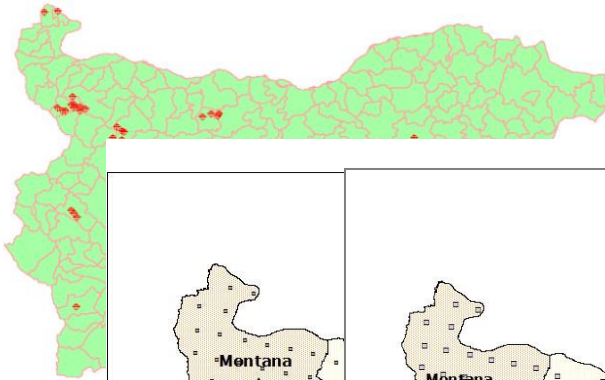
Toxic acid soils-
about 600 000 ha

Permanent tendency has been established to neutralization of the exchangeable acidity in the anthropogenically acidified soils due to reduced consumption of hydrolytically acid mineral fertilizers.

Under circumstances of active appearance of soil erosion processes and fertilization with acid mineral fertilizers, a tendency has been established to modification of the acid-alkaline equilibrium of the soil, connected with increase of the contents of exchangeable hydrogen and aluminum and severe reduction of basic elements

Schematic map made by detailed soil survey in the country during the period 1980-1995 year showed more detailed picture of location of “hot points”. Therefore, areas with supposed chemical impact need to be investigated using so called “specialized” monitoring.

Survey Heavy Metals of Pushkarov Institute TBS (territory belonging to one settlement)

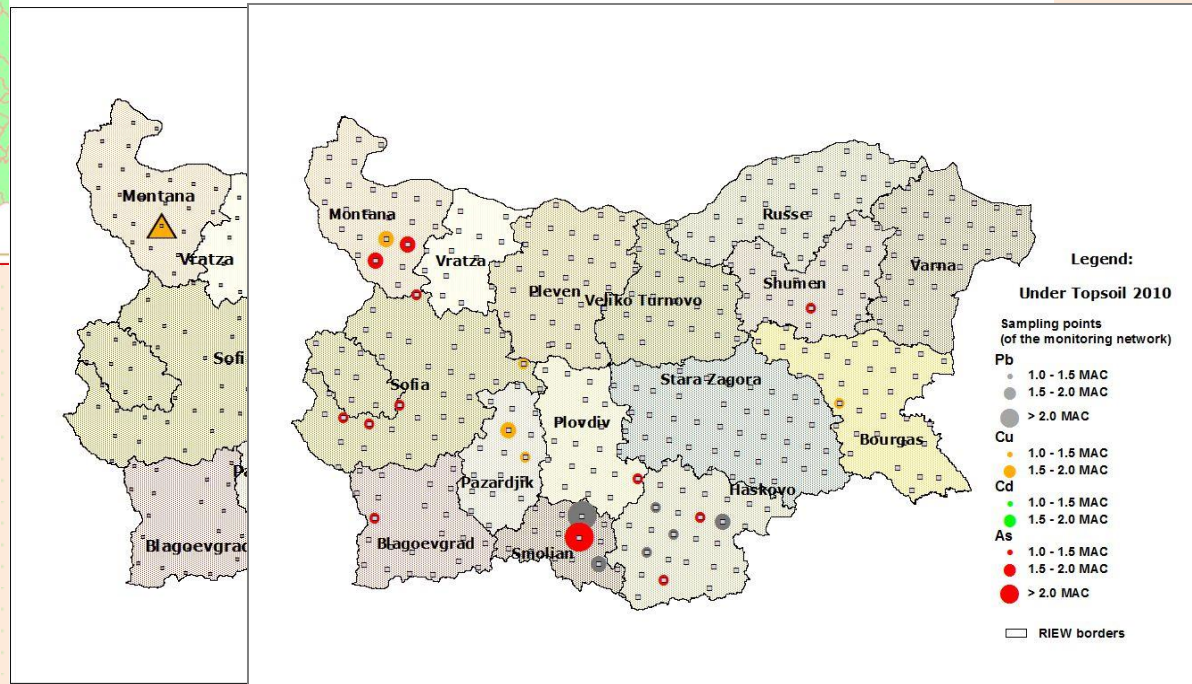


Contamination

Heavy metals and metalloids

Polluted sites- 40000 ha

Development and operation of the network monitoring (basic level) does not provide enough representative information about the chemical degradation of soil. Following results from last complete expeditions, 2010, confirmed the gaps on soil contamination areas.

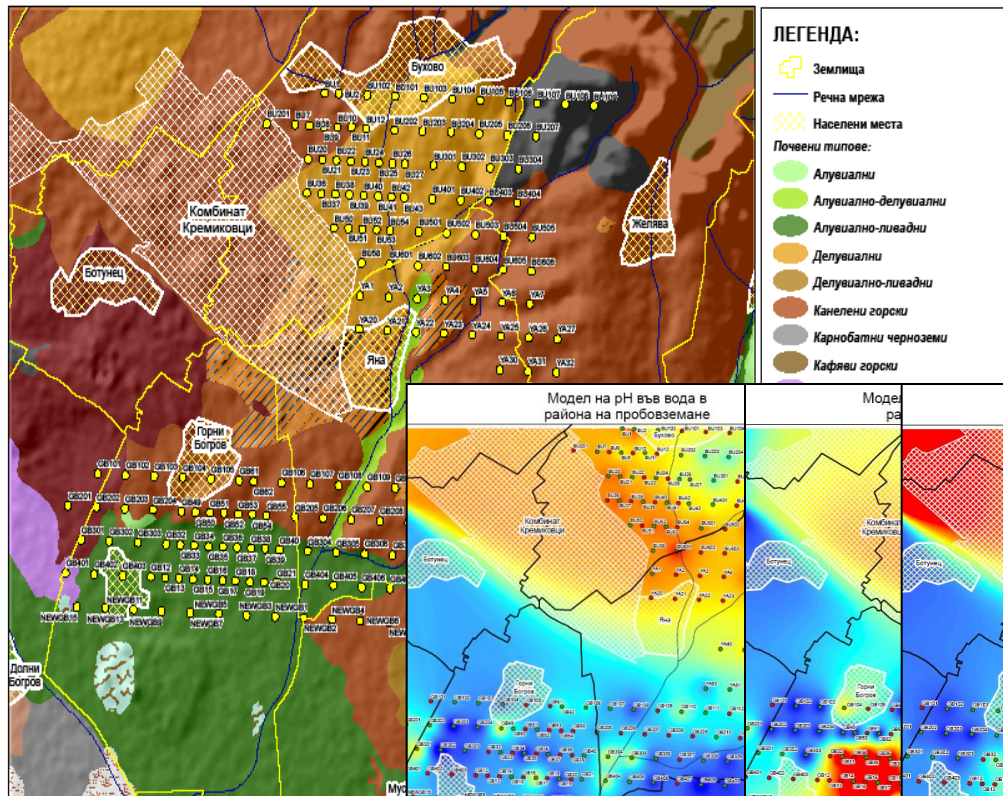


Detailed (second level) monitoring is oriented to cover places with diffuse and local degradation. The grid of network is 1x1 km and decreases till 0.2x0.2 km. The information has to be updated every 2-3 years. Selection of critical points, used to direct attention.

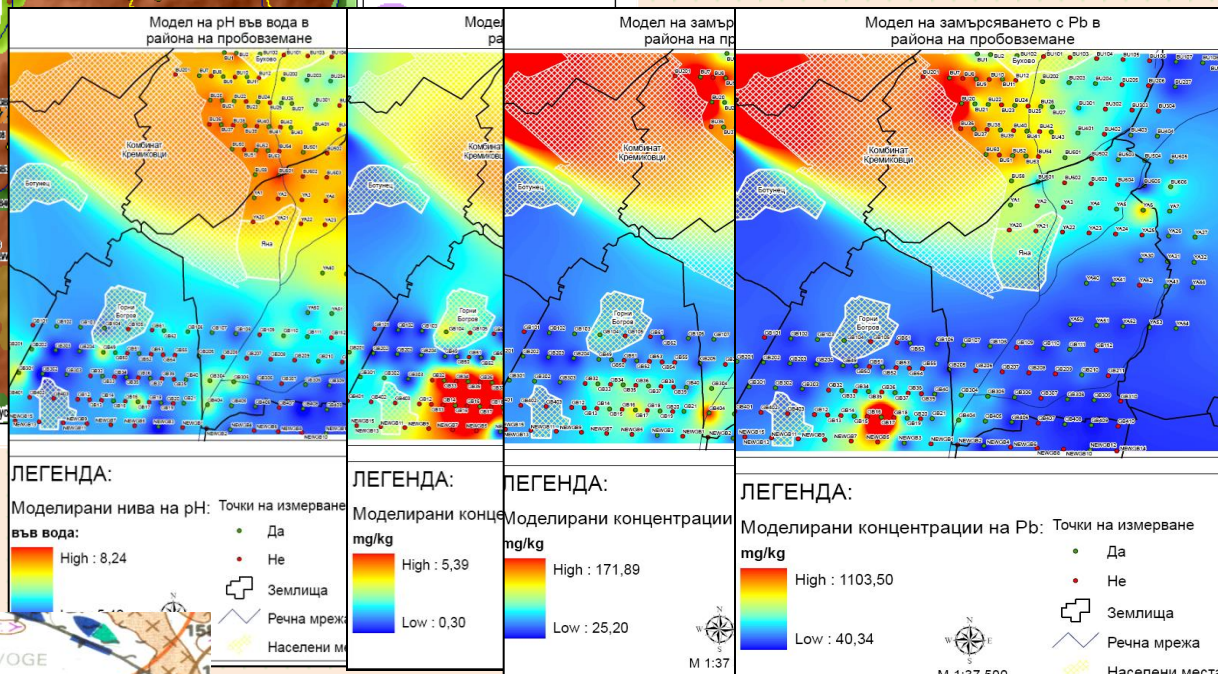
Indicators- total concentrations (aqua regia); and proposed bioavailability, soil biota, grass tests for real risk assessment- in progress.

Example- Object: Steel plant near Sofia- Kremikovci

Почвена карта на района на пробовземане



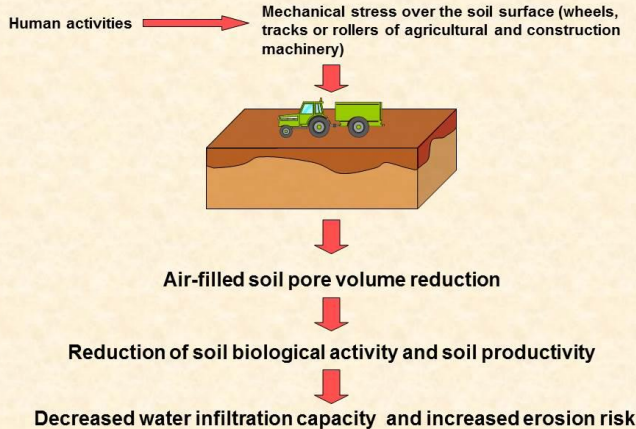
- Soil pollution is mainly caused by a steel factory /pedogenic origin- Pb, As
- Heavy metal levels in the soil greatly vary, up to 3000 mg/kg Pb and Zn & 15 mg/kg Cd.



- ✓ Select the right crop for each pollution level.
- ✓ Intensive monitoring of soil & crop quality
- ✓ Highest pollution level: flowers, seed production
- ✓ Lower pollution level: traditional agriculture (potatoes, selected vegetables)

SOIL COMPACTION

What is the reason for soil compaction



TOP3 Soil Compaction Indicators



Threat	Soil Compaction: The densification and distortion of soil by which total and air-filled porosity are reduced, causing a deterioration or loss of one or more soil functions.
Indicator 1	Density (bulk density, packing density, total porosity)
Indicator 2	Air capacity (volume of air-filled pore at a suction of 5 kPa)
Indicator 3	Estimated Vulnerability to Compaction is based on texture, density, climate, land use.

•Despite the absence of systematic observations, there are data indicating a permanent tendency to a structural degradation of Bulgarian agricultural soils. Development and application of specialized programs is necessary to maintain and improve soil structural stability focusing on use of agricultural machines with a reduced ground pressure, integrated with the measures for controlling soil erosion decline of soil organic matter, loss of biodiversity etc.

summary

No	Degradation processes	actual data		Trend
		area, ha x1000	%	
1	<u>Water erosion</u>	5638	50,8	+
2	<u>Wind erosion</u>	1350	12,2	-
3	<u>Declining of C</u>	3730	33,6	0
4	<u>Contamination</u>	40,0	0,4	+
5	<u>Biodiversity</u>	N.d..	-	0
6	Soil sealing	524,2	2,3	0
7	<u>Compaction</u>	1332	12.0	0
8	<u>Salinization</u>	35,5	0,3	-
9	<u>Acidification</u>	67,5	0,6	0
10	Excavation of soil	19,8	0,2	0



РЕПУБЛИКА БЪЛГАРИЯ
Министър на земеделието и храните

ЗАПОВЕД
№ РД09-122
София, 23.02.2015 година

На основание на чл. 25, ал. 4 от Закона за администрацията, чл. 42, ал.1 от Закона за подпомагане на земеделските производители и във връзка с чл. 93, §1, буква а) и *Приложение II* от Регламент (ЕС) № 1306 на Европейския парламент и на Съвета от 17 декември 2013 г. относно финансирането, управлението и мониторинга на общата селскостопанска политика и за отмяна на регламенти (ЕИО) № 352/78, (ЕО) № 165/94, (ЕО) № 2799/98, (ЕО) № 814/2000, (ЕО) № 1290/2005 и (ЕО) № 485/2008 на Съвета, както и одобрен доклад № 93-2275/23.02.2015 г.

НАРЕЖДАМ:

I. Отменям Заповед № РД 09-616/21.07.2010 г. на министъра на земеделието и храните (обн. ДВ, бр. 63 от 2010 г.), изменена със Заповед № РД 09-609/26.07.2011 г. (обн. ДВ, бр. 76 от 2011 г.); Заповед № РД 09-126/14.02.2012 г. (обн. ДВ, бр. 23 от 2012 г.), Заповед № РД 09-1418/18.12.2012 г. (обн. ДВ, бр. 21 от 2013 г.), Заповед № РД 09-93/07.02.2013 г. (обн. ДВ, бр. 21 от 2013 г.), Заповед № РД 09-501/25.07.2013 г. (обн. ДВ, бр. 77 от 2013 г.), Заповед № РД 09-123/10.03.2014 г. (обн. ДВ, бр. 27 от 2014 г.), Заповед № РД 09-150/12.03.2014 г. (обн. ДВ, бр. 27 от 2014 г.),

NATIONAL STANDARDS FOR GOOD AGRICULTURAL AND ENVIRONMENTAL CONDITION OF LAND

The Good Agricultural and Environmental Conditions (GAEC) are introduced by means of specially developed National Standards, taking in consideration the conditions of our country, and are related to the protection of soil against erosion, preservation of its structure and the organic matter in it.

The National Standards are mandatory for implementation by all farmers, owners and/or people using agricultural lands who are going to receive financial support according to different schemes of the Common Agricultural Policy (CAP), additional national payments, and measures in the Rural Development Programme regarding environmental protection.

National Standards for Good Agricultural and Environmental Condition of Land are developed according to Regulation (EU) No 1306/2013 on the financing, management and monitoring of the common agricultural policy. Republic of Bulgaria has adopted seven National Standards in the field of "Environment, Climate Change and Good Agricultural Condition of Land", which were approved by the Minister of Agriculture and Food.

Annually (from 01 to 31 January) Republic of Bulgaria submits information to the DG "Agriculture and Rural Development" in the European Commission (EC) about the adopted or supplemented National Standards (NS) regarding the conditions/terms for Good Agricultural and Environmental Condition of Land.

National Standards for Good Agricultural and Environmental Condition of Land in the field:

National Standard 1. Related to soil*water contamination, Nitrate Directive (Ordinance 2/2007)

It shall be prohibited to use mineral and organic nitrogen-containing fertilizers in buffer stripes:

- having minimum width of 5 meters in flat-country areas, alongside surface water sites (rivers, streams, canals, lakes, dams, sea), save for rice cells;
- having minimum width of 10 meters in flat-country areas in case of fertilization with liquid fraction of manure;
- having minimum width of 10 meters in case of fertilization on sloping ground;
- having minimum width of 50 meters in case of fertilization on steeply sloping ground.

National Standard 2. Related to soil erosion \water, irrigation erosion

Where water is used for irrigation the farmer must have the relevant document evidencing the right to use (permit, contract, etc.).

National Standard 3. Related to soil contamination

It shall be prohibited to directly and indirectly discharge harmful substances into underground waters.

Farmers shall take measures to avoid contamination of the soil surface, land and farm land during storage and use of plant protection products, fertilizers, disinfectants, oils and fuels, veterinary medicinal preparations and other substances, insofar as they relate to agriculture.

National Standard 4. Related to soil erosion and carbon declining)

In farms having a unique identification number and arable area exceeding 5 hectares the overall crop rotation area must include at least 30% of crops with unbroken/unseparated surface, except for tobacco production.

National Standard 5. Related to soil erosion

The following shall be applied to limit erosion of sloping areas:

- for arable land: soil treatment shall be made perpendicular to the slope or the horizontal lines;
- for permanent crops: consolidation of rows between crops by full/partial grassing, and/or sowing/planting other cultures and/or soil treatment shall be made perpendicular to the slope or the horizontal lines.

National Standard 6. Related to carbon declining and biodiversity

Stubble burning shall be prohibited.

National Standard 7. Related to soil erosion, carbon declining and biodiversity

It shall be mandatory to protect and maintain the existing:

- field boundaries in the unit of the farm and/or agricultural plot;
- permanent terraces in the unit of the farm and/or agricultural plot;
- permanent pastures, commons and meadows against invasion of unwanted vegetation: eagle fern (*Pteridium aquilinum*), Veratrum (*Veratrum spp.*), tree of heaven (*Ailanthus altissima*) and false indigo-bush (*Amorpha fruticosa*);
- hedgerows and trees that are not cut during birds' breeding season and raising period (from 1 March to 31 July).

A wide-angle photograph of a lavender field. The rows of purple flowers stretch far into the distance, creating a strong sense of perspective. A narrow dirt path winds through the center of the field, leading the viewer's eye towards the horizon. In the background, a dense line of green trees is visible under a clear sky. The overall scene is peaceful and scenic.

Thank you for attention