Voluntary and incentives programmes for soil protection in Serbia

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What we are fighting for ?

Basic information about the soil types in Serbia

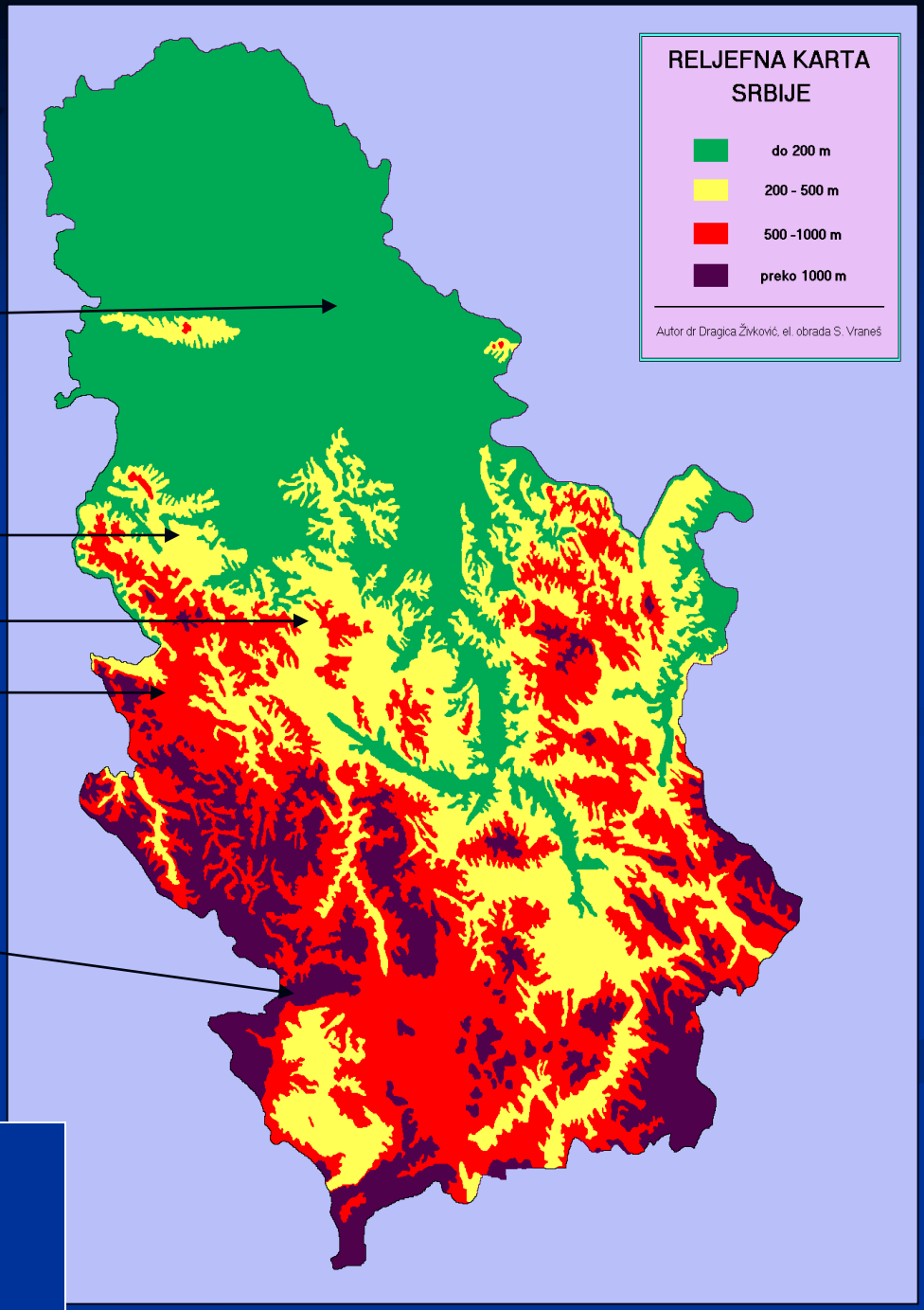
Republic of Serbia is a land country which cover **88 361** km^2, where Central Serbia covered **55 698** km^2, Vojvodina **21 506** km^2, and Kosovo **10 887** km^2.

Relief map of Serbia

According to the land's height, lower parts (up to 200 m) participate about 37% of country teritory.

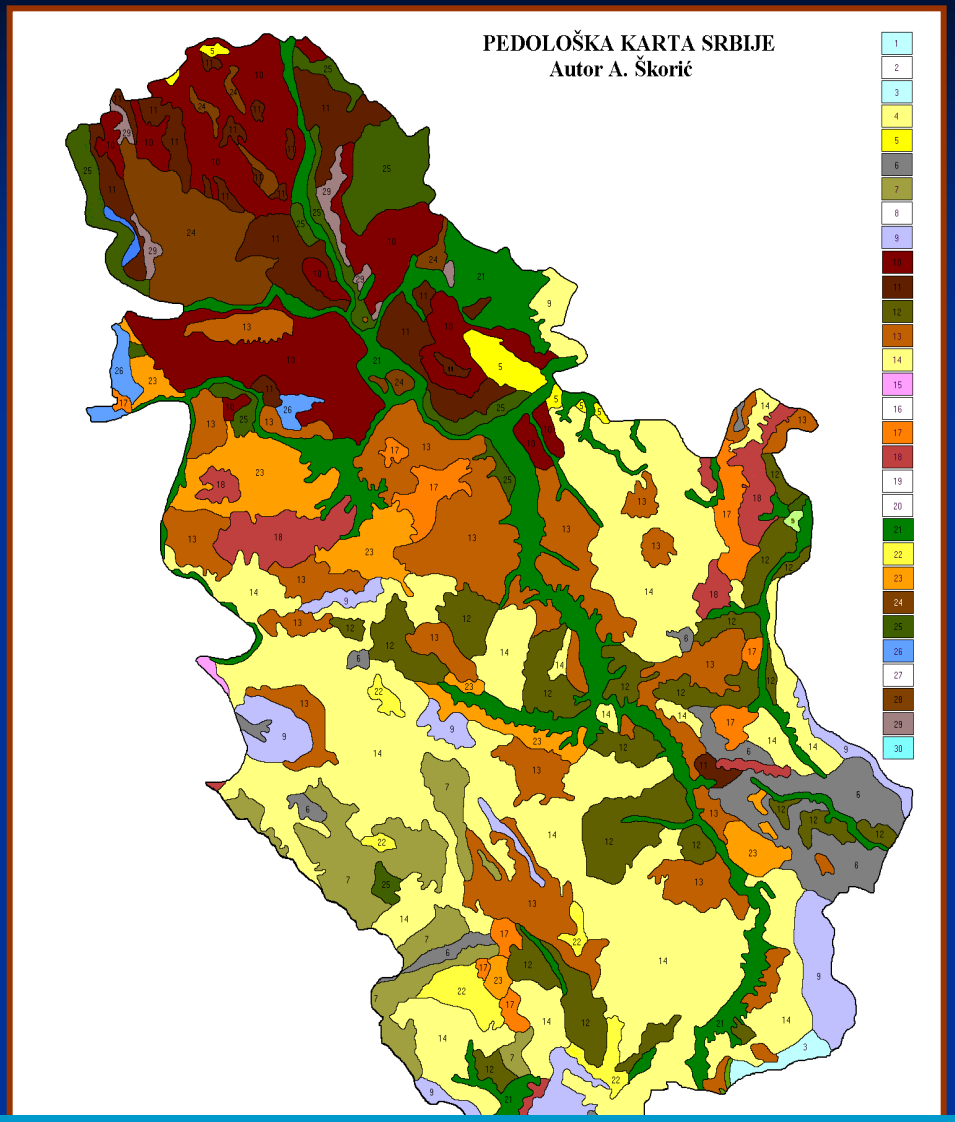
The same part of the country belongs to low hill's part (200-500 m) and low mountain belt (500-1000 m), or 26%.

To the mountain area (over 1000 m) belong 11% of Serbian territory.



- ***Two geographical regions***
- ***Three pedological region***

Legend: Pedolgical map of Serbia R = 1: 2 000000



Serbian soils are with a great number of systematic units, as a product of different soil forming conditions

1.Goli krš sa pegama Crvenica, Smeđeg zemljišta i Litosola
2.Litosoli i eutrično smeđa zemljišta
3.Litosoli na kiselim stenama i Rankeri
4.Regosoli, Rendzine i Eutrično smeđa zemljišta
5.Arenosol i Eutrično smeđa zemljišta na resku
6.Krečnjačko dolomitne crnice, Litosoli i Rendzine
7. Krečnjačko dolomitne crnice, Smeđa zemljišta na krečnjaku i Crvenice
8.Rendzine i Regosoli
9.Rankeri i Distrično smeđa zemljišta
10.Černozem na lesu
11.Černozem i Černozemno-semiglejno zemljište
12.Smonice
13.Eutrično-smeđe zemljište
14.Distrično-smeđa zemljišta – Lesivirana i Smeđa zem. na krečnjaku i dolomitu
15.Smeđe zem. Lesivirano i Crnica na krečnjaku i dolomitu
16.Crvenica lesivirana, i Smeđa zemljišta na krečnjaku
17.Lesivirana i Eutrična smeđa zemljišta
18.Lesivirana zemljišta
19.Lesivirano pseudoglejno zemljište i Rendzine
20.Lesivirano akrično zem. Smeđe na krečnjaku i Distrično smeđe zem.
21.Fluvijativna i euglejna zemljišta
22.Pseudogleji
23.Pseudoglej i Lesivirana pseudoglejna zemljišta
24.Černozemno semiglejno zemljište
25.Ritske crnice
26.Glejna i Semiglejna zemljišta
27.Močvarno glejna zemljišta (euglejna)
28.Tresetna zemljišta
29.Halomorfna zemljišta (solončak i solonjec)

PROBLEMS IN PROPOSING SOME SIMPLE APPROACH TO DEVELOPING A SOIL PROTECTION STRATEGY IN SERBIA

- The wide variety of natural soil types and characteristics and range of possible functions and uses makes the development of a soil protection strategy which sets out clear objectives and standards more problematical than developing objectives and standards for other environmental medium such as air or water.

A bit of history of soil protection strategy…

Serbia as a future part of EU?

A small administrative pressure on our Government …

We started to read EU documents…

…to try to make our (similar) strategy for soil protection…

Box 1. Sixth Environment Action Programme and the Thematic Strategy on the protection of soil

The Sixth Environment Action Programme (6th EAP) is a programme of EU action on the environment with key objectives covering a period of ten years.

- **The loss of soil (erosion) is made worse by inappropriate cultivation techniques and inadequate cropping practices.**

- **Soil organic matter, the organic fraction of soil, is very important for the *fertility, structure, water retention capacity and biodiversity of soil*. The decline of soil organic matter in soil threatens soil fertility, soil structure and the capacity of soil to retain rainwater, and worsens climate change effects.**

- **Salt is already present in our soil but the vast majority of salinisation (the build up of salts in soil) is due to the fact that humans alter the way water moves through the environment by irrigation. Artificial fertilizers can also add salts to soil. As a result soil fertility drops and ultimately it may even be unable to sustain hardly any plant growth.**

- **Excessive stocking rates and the inappropriate use of heavy machinery in agriculture makes the soil too compact (compaction). This reduces the soil's capacity to retain water and to supply oxygen to plant roots.**

- **Urban and industrial sprawl and transport networks have sealed a significant proportion of EU soil (sealing), leading to irreversible loss of fertile soils.**

- **As a result of over two hundred years of industrialization, Europe has a problem of soil contamination due to the use and presence of dangerous substances in production.**

A "SOIL PROTECTION STRATEGY" IN SERBIA HAS BEEN CONDUCTED BY THE ACTIVITY OF TWO HOUSES

Serbian Government

Ministry of Agriculture, Forestry and Water Management

Happy, because of some income…

The Ministry of Environment and Spatial Planning

Want to be strong, but no income…

Two houses recognized problems…

- Two houses had recognized inadequate soil protection as one of the most serious threats to environment in Serbia.
- Problems arise from poorly developed infrastructure as well as from bad habits and insufficient care for the environment.

Ministry of Agriculture, Forestry and Water Management

The Ministry of Environment and Spatial Planning

The Ministry of Environment and Spatial Planning

Sector for protection of natural recourses

This strong house still not have a document of soil protection strategy …

- Air protection;
- Water protection;
- Soil protection;
- Implementation of international conventions, contracts and other low regulation related to the air, water and soil protection as national natural recourses;
- Participation in planning strategic documents and plans;
- Participation in basic low regulation by preparing an expert opinion;
- Proposing projects;
- Participation in the international cooperation;

Ministry of Agriculture, Forestry and Water Management

- **“Low of Agricultural Land”**

(“Sl. Glasnik RS” No.62/2006, 65/2008 – state low of Serbia)

Chapter II: Planning of Soil Protection, Regulation and the Use of the Agricultural Land

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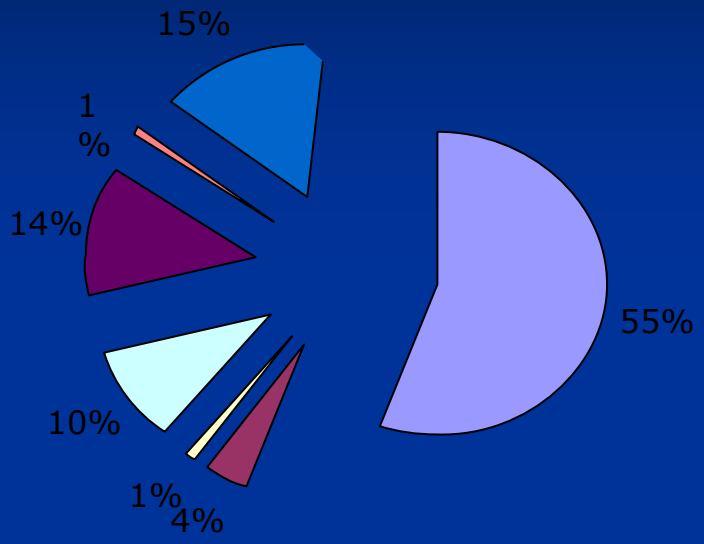
- ***Objective: It not a document of soil protection strategy …***

  It is just a tool for conducting some soil protection measures…
- ***Objective: Concern only a problems of agricultural land***

  But, generally, each low is a good if it is applied…

Agricultural land of Serbia

Data source: *Statistical Office of Republic of Serbia* (2005.godina)



Ministry of Agriculture, Forestry and Water Management

Agricultural land of central Serbia and Vojvodina cover 5,112 million hectares, Cultivated area cover 4,24 milion hectars (82,98 %). Central Serbia has 61,13%, and Vojvodina 38,87 %.

Field crops cover 3,3 million hectares (78,5% of cultivated land) orchards and vineyards covered 300.000 ha.

A statistical trend in a last 15 years showed decrease of cultivated land (about 8.000 ha of fields and gardens) toward meadows and pastures.

A bit of history of the policy for soil protection strategy…

- The Government considered that an important first step in the development of a soil protection strategy was to **assemble existing information on soil resources** in Serbia and to examine the pressures and impacts on soil resources.
- Our projects started in **1992.** and finished **2009.**
- **Two National and regional** *(Vojvodina and Central Serbia only)* **projects has been done**
- The results: **soil fertility mapping** and **the map evidence of present soil pollutants in Serbian soils**

"Low of Agricultural Land"

(No.62/2006, 65/2008 – state low of Serbia)

Who supported this projects:

Soil Science Society of Serbia;

(Meetings every 2- 4 years)

- **Give analyses about the present soil situation in the country as a country's main natural resource**
- **The analysis of the soil use according to the sustainable development of the country: focus on the processes which lead to its degradation**
- **Soil ecological aspects related to its protection**
- **To emphasised the main priorities in the soil preservation process through measures which will be primary applied on the agricultural soil just to support its production capabilities**
- **Summarized data can be used for further steps in regulatory and institutional practice which is aimed to preserve soil's economical, social and ecological potential as a main natural resource**

Today in Serbia we can say that main soil treats for soil losses and degradation are in following order:

1. **Sealing soils - the loss and soil damage due to the industrialization, mining, energetic and transport network activities…** *bad perspective…*
2. **Decline of soil organic matter…** *bad perspective…*
3. **Acidification or alkalization of soils…** *bad perspective…*
4. **Various type of soil contamination (agrochemicals, heavy metals, industrial pollution ….)…** *bad perspective…*
5. **Erosion all types of wind and water…** *bad perspective…*

Ministry of Agriculture, Forestry and Water Management

- Soil fertility control financed by 
- 56.000 soil samples were analyzed in 2009.
- About 900.000 euros has been spent for this purpose
- This job has been done by state Professional Service
- There are 12 PS in Vojvodina and 21 in Central Serbia
- PS cover 2-4 Communities, and 5/15 people is employed
- *Professional profile of employees are not satisfied*

Ministry of Agriculture, Forestry and Water Management

- The project of soil acidity neutralization started in 2003.
- The farmers have now state subvention for used Ca-material
- In a last years, between 4500-7000 ha has been done each year
- Now we can say that over the 70.000 ha has been calcified
- Acidity is the one of the major problem of the fertility of our soils

- **43%** of cultivated area has increased potential acidity and belongs to the class of very acid and acid soils (1.197.000 hektara),
- **20%** belongs to the soils with low acidity
- **35%** belongs to the soils between low acid and neutral soil
- **2%** of Serbian soil are alkaline

Ministry of Agriculture, Forestry and Water Management

- The project against wind erosion in Vojvodina
- Started last year (2009)
- The planting safety field shelterbelts
- In a last year it was spent about 250.000 euros for this purpose
- In this year this project will be continued

Ministry of Agriculture, Forestry and Water Management

- There is no direct influence of  for soil organic matter improvement
- Some low regulation (like forbidding straw burning at the fields) can improve indirectly aspect of SOM
- Soil fertility control can initiate the increase application of organic mater into the fields

  - Mineral fertilizer use: 1991-2007- from average application of 115kg/ha in 1987 there is decrease to 40kg/ha

Ministry of Agriculture, Forestry and Water Management

- **Sealing soils -** *(e.g. from 1957-1993. upon these activities the soil loss were about 220.000 ha capturing mostly agricultural, fertile soils)**

  **Statistical Office of Republic of Serbia*

- *Today's bad practice: Each year this loss is about 34.000 ha of (agricultural) land…**

∗ *bad perspective if this rhythm is continued…*

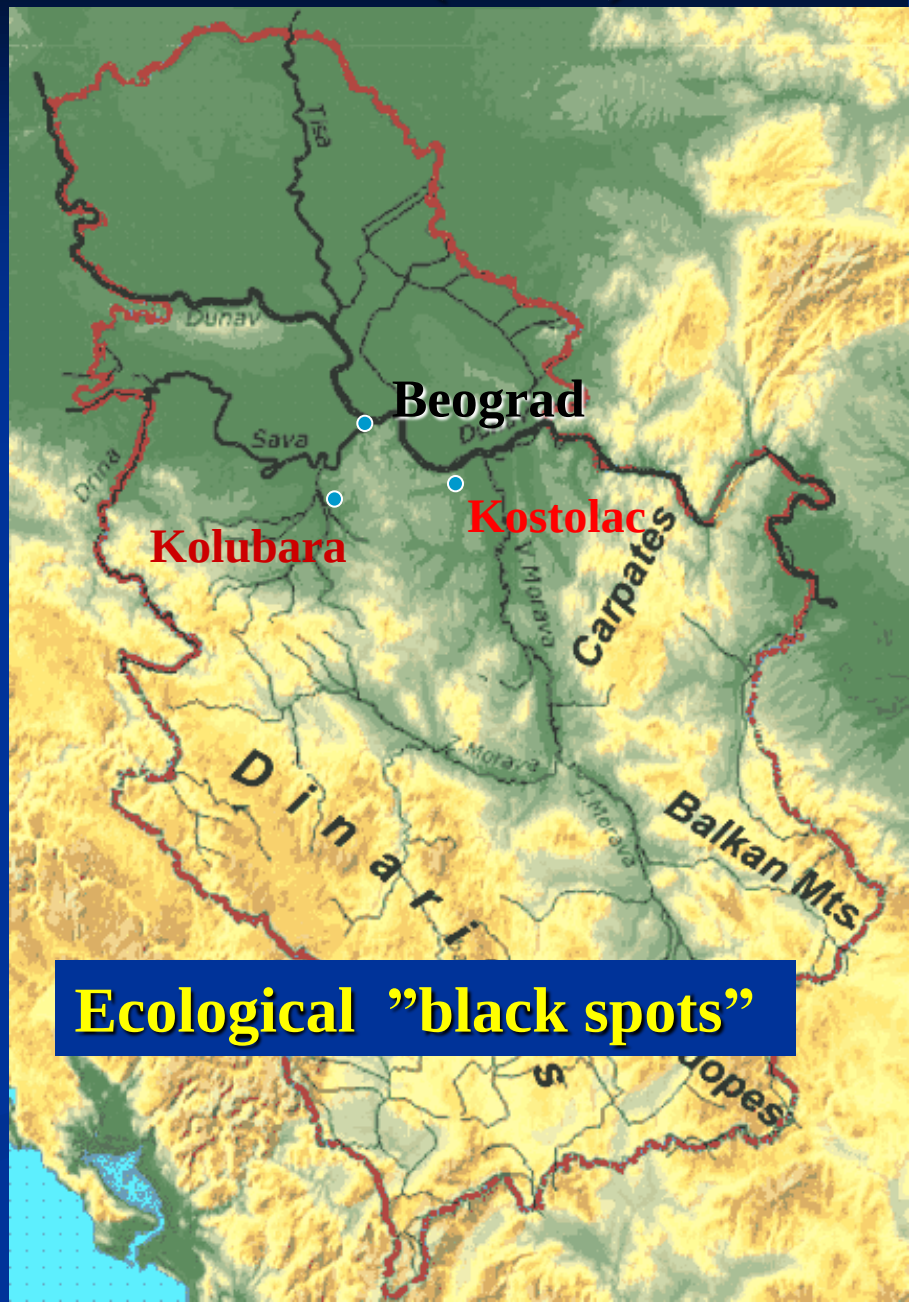
The biggest problem of the soil protection as a most important natural resources in our country

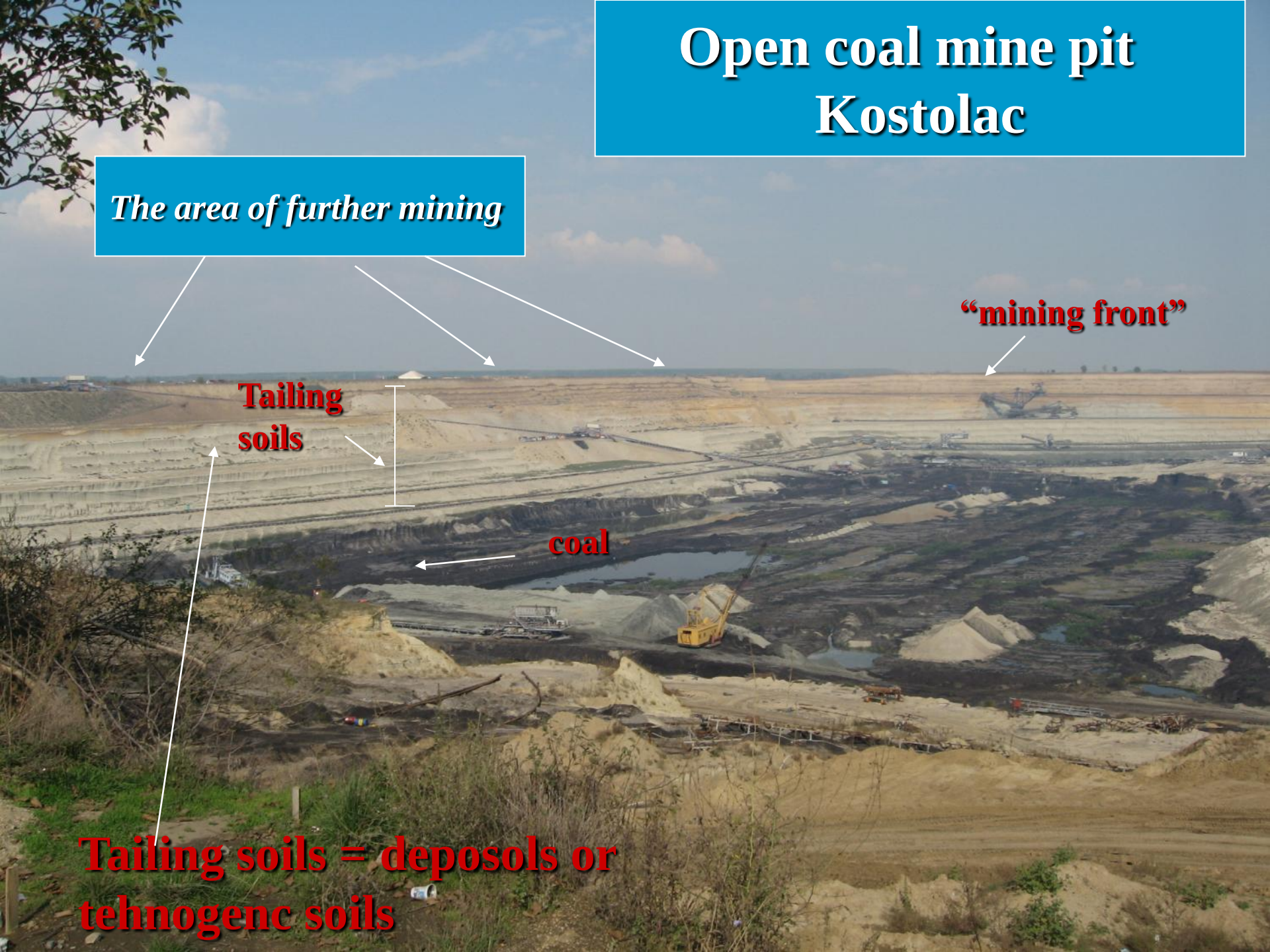
Generally, each low is a good if it is applied…

But what is happening in practice…

Exploitation of mineral resources (coal)

- Open coal mine pits in Serbia captured a high productive alluvial soils caa. 10.000-12.000 ha in not ameliorated. Locations are at Kolubara and Kostolac PPS basin.
- Formed ash dumps of PPS covers about 1145 ha, with great number of ecological, geomorphologic and hydrological consequences




Open coal mine pit
Kostolac
The area of further mining
"mining front"
Tailing
soils
coal
Tailing soils = deposols or
tehnogenc soils

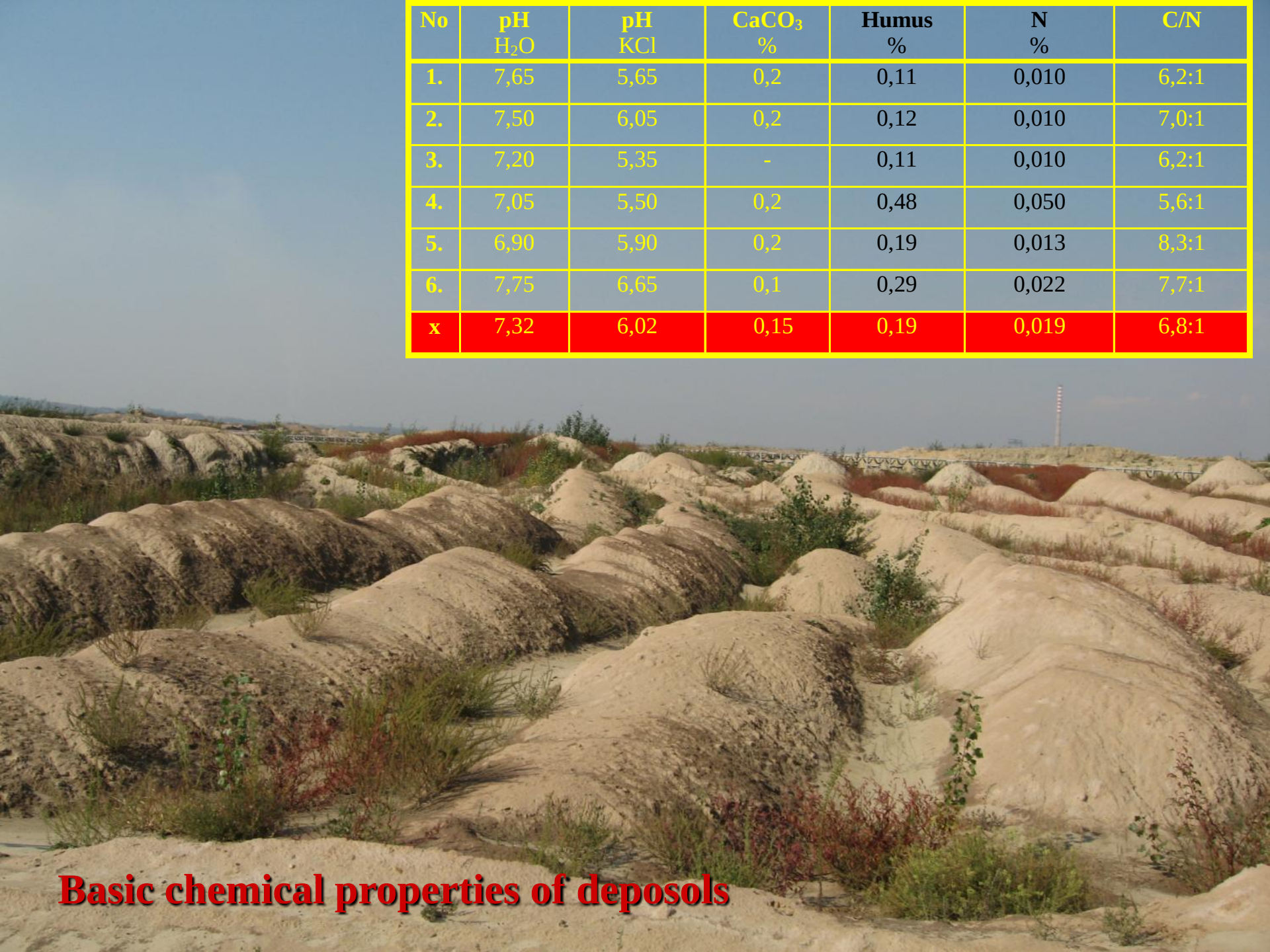
Each year about 150 ha has been captured by this mining activities

Desert in Serbia?

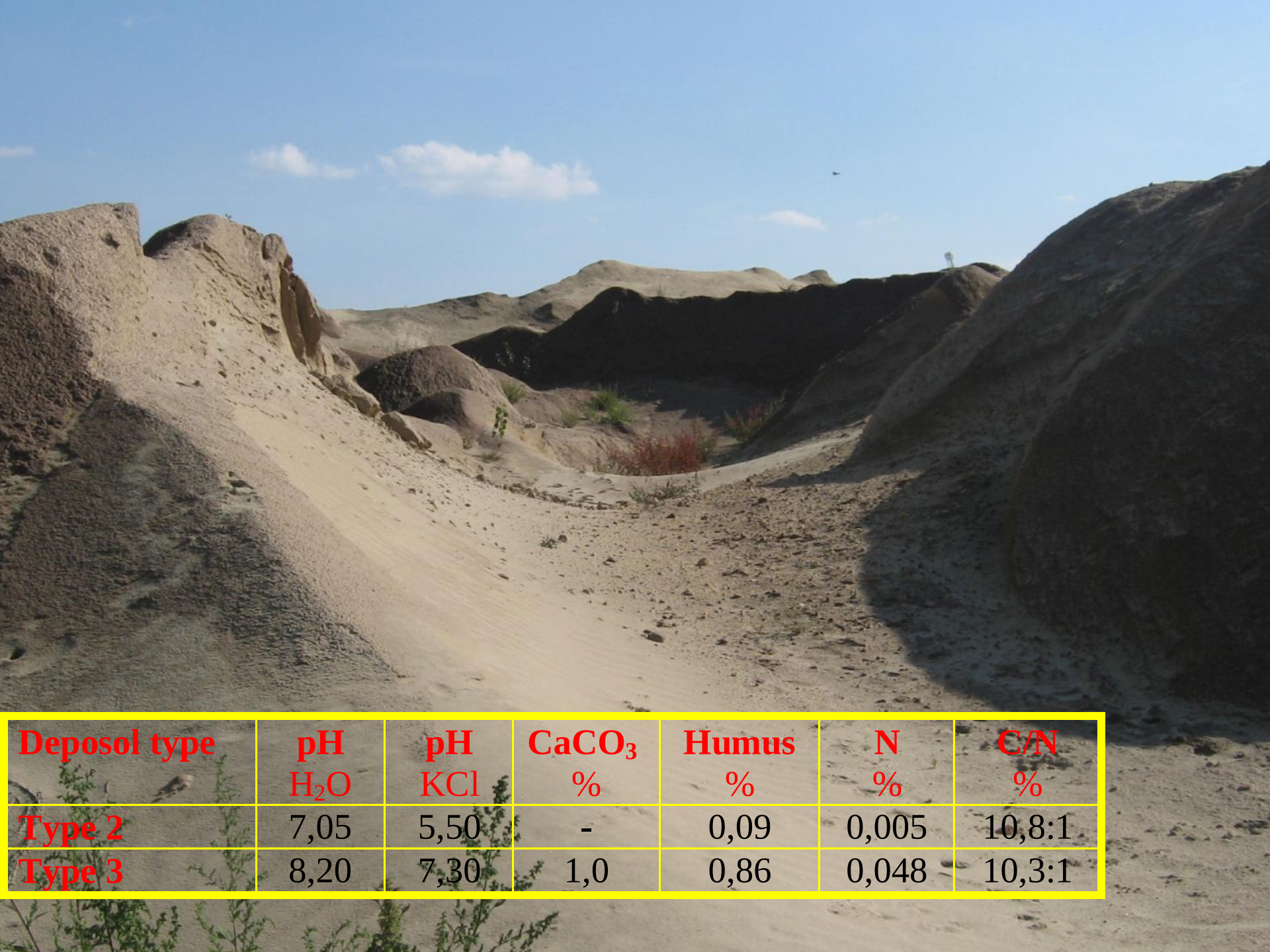
Physical properties of obtained deposols at Kosotolac

	Gravel < 2mm	Sand 2-0.05 mm	Dust 0.05-0.002 mm	Clay <0.002 mm	Teksture class
1	14.32	68.48	12.27	4.93	Gravel sandy loam
2	14.28	68.92	11.69	5.11	Gravel sandy loam

No	pH H_2O	pH KCl	$CaCO_3$ %	Humus %	N %	C/N
1.	7,65	5,65	0,2	0,11	0,010	6,2:1
2.	7,50	6,05	0,2	0,12	0,010	7,0:1
3.	7,20	5,35	-	0,11	0,010	6,2:1
4.	7,05	5,50	0,2	0,48	0,050	5,6:1
5.	6,90	5,90	0,2	0,19	0,013	8,3:1
6.	7,75	6,65	0,1	0,29	0,022	7,7:1
x	7,32	6,02	0,15	0,19	0,019	6,8:1



Basic chemical properties of deposols



Deposol type	pH H_2O	pH KCl	$CaCO_3$ %	Humus %	N %	C/N %
Type 2	7,05	5,50	-	0,09	0,005	10,8:1
Type 3	8,20	7,30	1,0	0,86	0,048	10,3:1

Exploitation of other mineral resources (ore)

Eco ”black spots ” Cu exploitation

Tailing soils which contain metallic waste.

The complete absence of the plan about the deposing this tailing material. Amelioration measures missed, jeopardizing all surrounding area (mining baisns).

Exploitation of other mineral resources (ore) (material for constructions)

- **Close to the rivers (Dunav, Sava, Drina, Morava, Ibar, Pek), sand and gravel has been collected. There is about 125 of this position in Serbia, destroying on this way about 60 ha of excellent agricultural**

This palaces usually are converted in swamps or small lakes

- **Clay products - especially in Vojvodina (Kikinda, Kanjiža, Sremski Karlovci, Bečej). This concern the use of agricultural soil, where the volume of 6 miliona m ^{3} used of from the usual digging depth of 6 m clay subsoil,, gives the annual land loss of 100 ha.**

SOIL IS NOT RENULABLE NATURAL RESOURCE

Some aims of the future soil protection strategy

- Strict control in soil use for non agricultural purpose
- Soil fertility and pollution control
- Conducting a soil amelioration measure according to low regulations
- The agriculture in our country is still main recipient and also the main supporter of rural development, so, there is a general need to improve and protect soil quality and productivity

But, we must have a walid soil protection strategy

About the Serbian soil protection strategy…

I'm sure that the people from my two houses will do it! I am the boss…