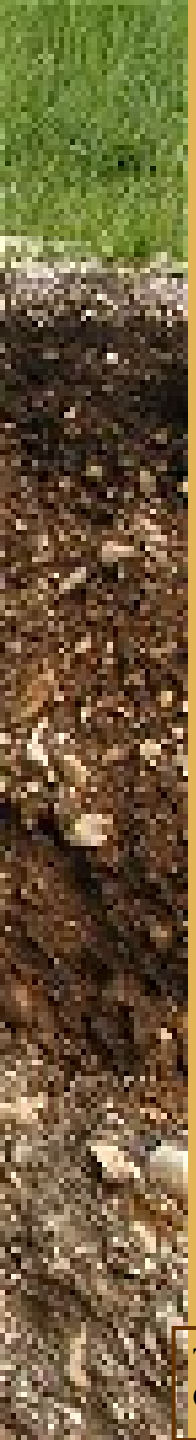

University of Ljubljana, Biotechnical faculty
Centre for Soil and Environmental Sience

EU Framework Directive for Soil Protection

Actions in Slovenia

Marko Zupan, Petra Krsnik***

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1000 Ljubljana, Slovenija
E-pošta: petra.krsnik@gov.si
http://www.arso.gov.si







Information on soil properties:

- Soil maps: 1:25.000, 1:250.000, 1:1M
- Soil thematic maps (vulnerability, suitability, ...)
- *National Soil Information System*

Disscusions on Soil Theats:

- Meetings and conferences (GLOBE, PDS)

Actions and Documents:

- National Environmental Action Plan (ReNPVO, 2006)
- Local Environmental Action Plan (Municipaltiy of Maribor)
- Publications (Soil pollution, 2008)
- Research projects (Harmonization of parametrs for NSIS and several others)
- Decree on remediation of contaminated areas (Mezica valey; 2008)

Slovenian Soil Science Socitety

The council for environmental protection of the republic of Slovenia

Ministry of Environment and Spatial Planning

Environmental Agency of the Republic of Slovenia

Ministry of Agriculture, Forestry and Food

THE ECOLOGY WORKING GROUP FOCUSSING ON SOIL CONSERVATION OF DANUBE COUNTRIES WORKING COMMUNITY - M. Zupan, University of Ljubljana, Centre for Soil and Environmental Research

SOIL DEGRADATION

- reversible
- irreversible

GLOBAL WARMING

CLIMATE CHANGES

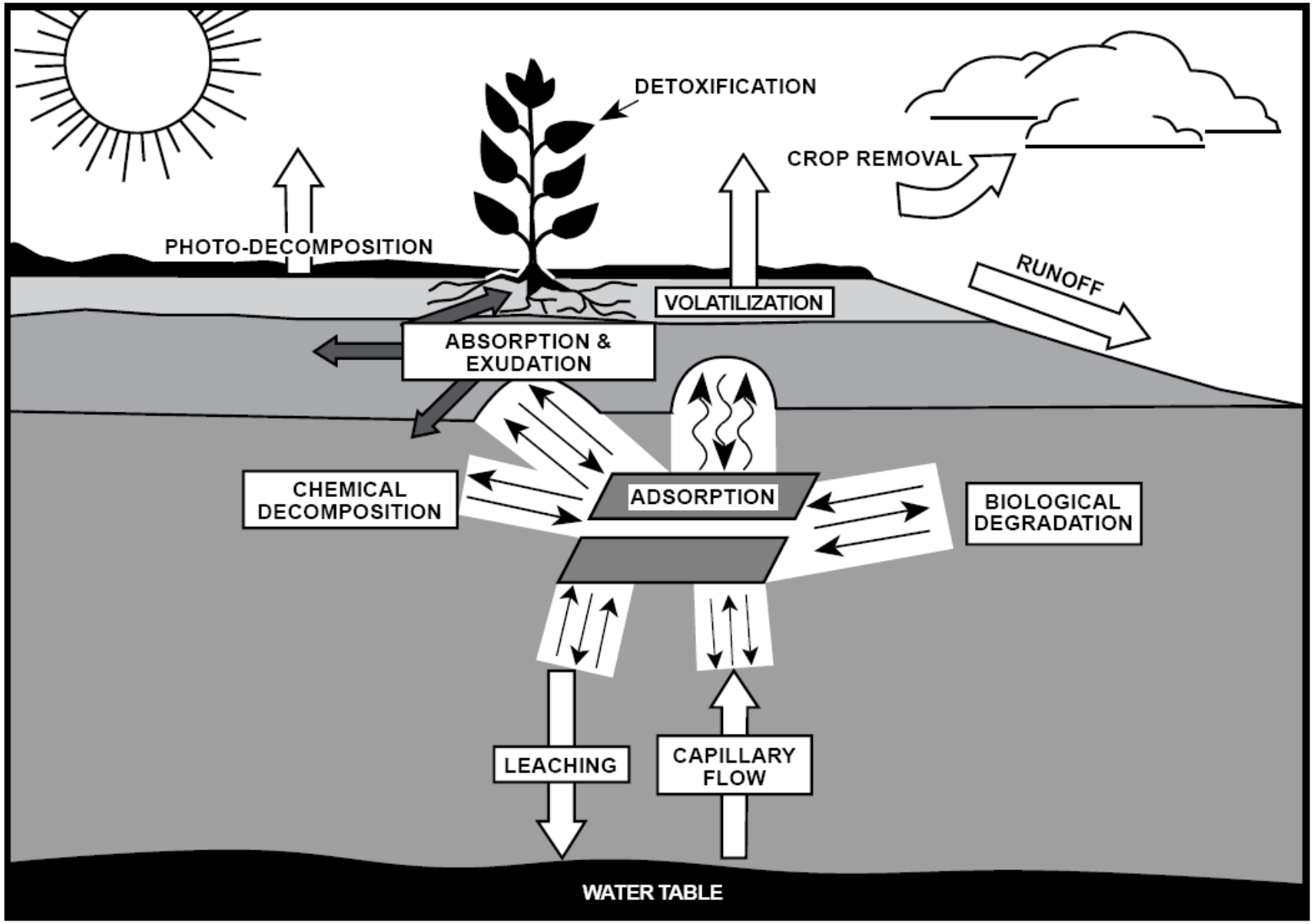
Soil Threats - EU (COM 231, 2006)

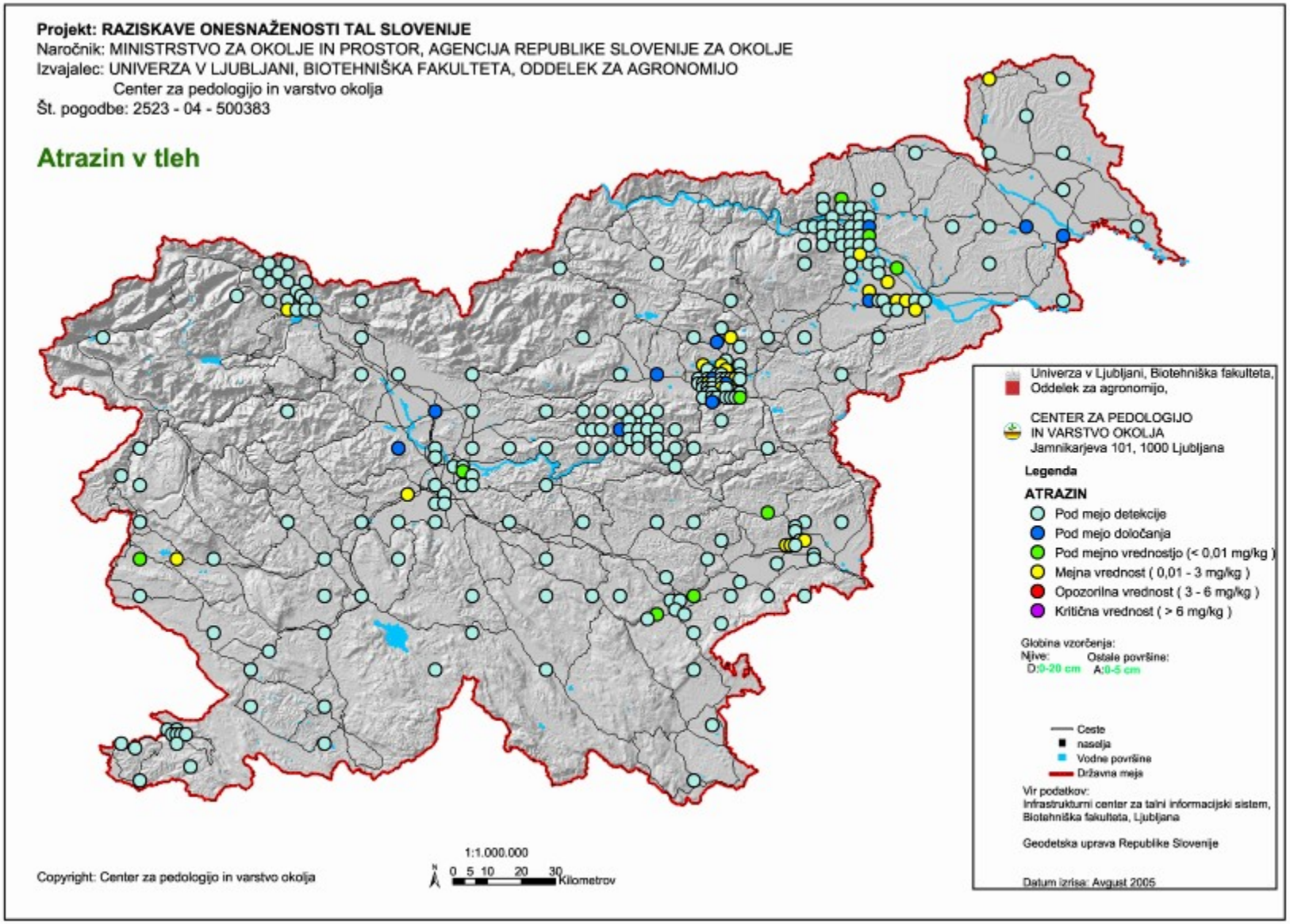
Expert judgement for Slovenia:

EROSION	**
SEALING	****
CONTAMINATION	*****
ORGANIC MATTER DECLINE	***
LANDSLIDES	***
SALINIZATION	*
COMPACTION	**
BIODIVERSITY DECLINE	**

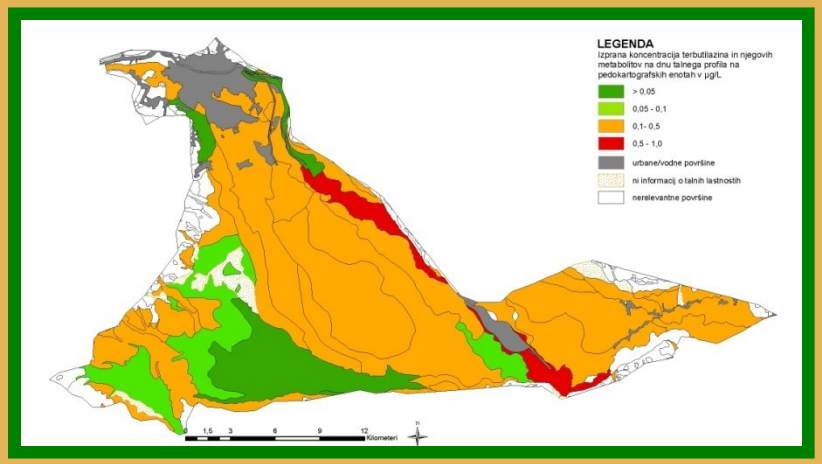
SOIL CONTAMINATION – INVISABLE TREATH

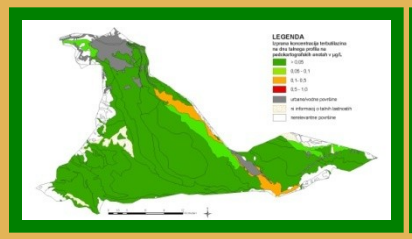
PESTICIDES

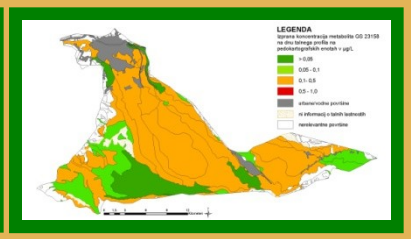

DETOXIFICATION
CROP REMOVAL
PHOTO-DECOMPOSITION
RUNOFF
VOLATILIZATION
ABSORPTION & EXUDATION
CHEMICAL DECOMPOSITION
ADSORPTION
BIOLOGICAL DEGRADATION
LEACHING
CAPILLARY FLOW
WATER TABLE


Projekt: RAZISKAVE ONESNAŽENOSTI TAL SLOVENIJE
Naročnik: MINISTRSTVO ZA OKOLJE IN PROSTOR, AGENCIJA REPUBLIKE SLOVENIJE ZA OKOLJE
Izvajalec: UNIVERZA V LJUBLJANI, BIOTEHNIŠKA FAKULTETA, ODDELEK ZA AGRONOMIJO
Center za pedologijo in varstvo okolja
Št. pogodbe: 2523 - 04 - 500383
Atrazin v tleh
Univerza v Ljubljani, Biotehniška fakulteta, Oddelek za agronomijo,
CENTER ZA PEDOLOGIJO IN VARSTVO OKOLJA
Jamnikarjeva 101, 1000 Ljubljana
Legenda
ATRAZIN
Pod mejo detekcije
Pod mejo določanja
Pod mejno vrednostjo (< 0,01 mg/kg)
Mejna vrednost (0,01 - 3 mg/kg)
Opozorilna vrednost (3 - 6 mg/kg)
Kritična vrednost (> 6 mg/kg)
Globina vzorčenja:
Njive: Ostale površine:
O:0-20 cm A:0-5 cm
Ceste
naselja
Vodne površine
Državna meja
Vir podatkov:
Infrastrukturni center za talni informacijski sistem, Biotehniška fakulteta, Ljubljana
Geodetska uprava Republike Slovenije
Datum izrisa: August 2005
Copyright: Center za pedologijo in varstvo okolja
1:1.000.000
0 5 10 20 30 Kilometrov

PESTICIDES

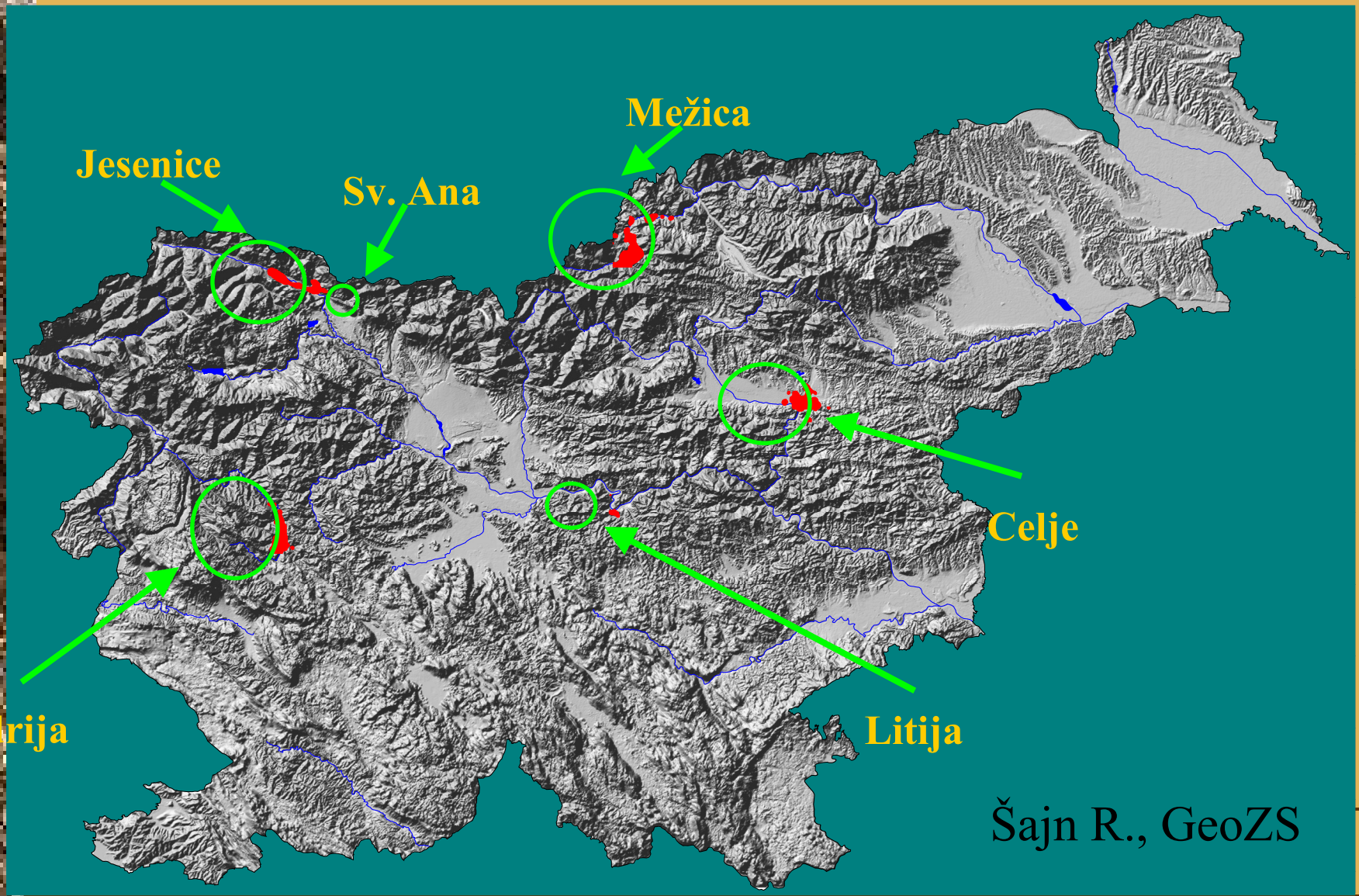

LEGENDA
Izprana koncentracija terbutilazina in njegovih metabolitov na dnu talnega profila na pedokartografskih enotah v µg/L
> 0,05
0,05 - 0,1
0,1- 0,5
0,5 - 1,0
urbane/vodne površine
ni informacij o talnih lastnostih
nerelevantne površine
1,5 3 6 9 12 Kilometeri



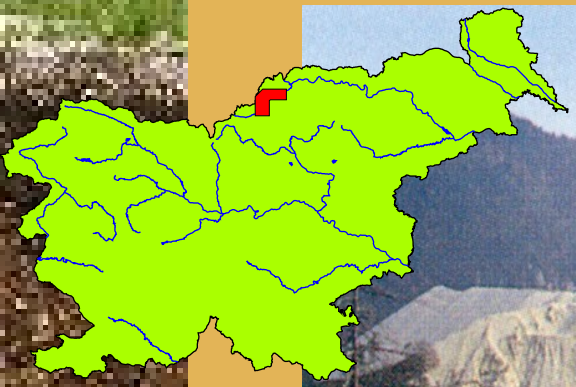


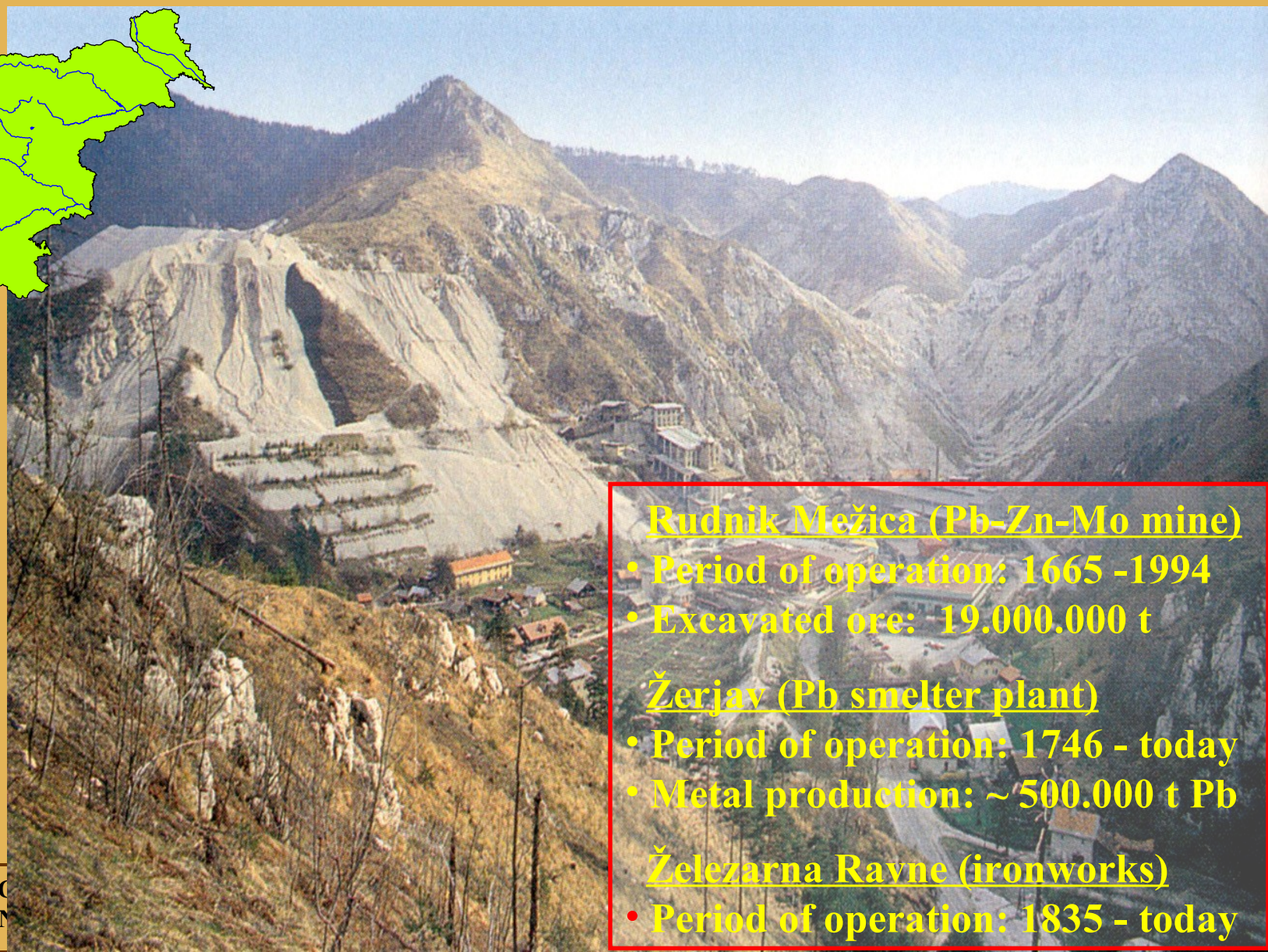

Buffalo
Buffalo

MINIG AND SMELTING FACILITIES



Impacts of Pb-Zn mine, Pb smelter and ironworks in Meža valley





Rudnik Mežica (Pb-Zn-Mo mine)

- Period of operation: 1665 -1994
- Excavated ore: 19.000.000 t

Žerjav (Pb smelter plant)

- Period of operation: 1746 - today
- Metal production: ~ 500.000 t Pb

Železarna Ravne (ironworks)

- Period of operation: 1835 - today

THE EC
OF DAN

Meza valley – smelter site ZERJAV

1970 - 1980 the most severe pollution (SO_2)

Wally of death

NATURAL SUCCESSION

(tolerant plants hyperaccumulators, ...)

SOILS ARE STILL HEAVILIY CONTAMNATED!

Decree on improvement of environmental conditions in Meza valley, 2008!

Recultivation, remediation and reuse of contaminated soils

Brownfields in urban areas

- could be rebuilt with new buildings or pavements (reuse)
- special care on management of contaminated material.
- all uncovered areas (soils) should be stabilised, covered with unpolluted fertile soil layer and revitalised with plants (grass or other cover plants).

BROWNFILED REMEDIATION: ‘Old zinc smelter’ site Celje

Soil legislation in Slovenia

- Article No. 96. of Environmental Protection Act - monitoring of the State of the Environment (OJ RS, No. 32/93, 41/04, 39/06)
- Decree on the limit input concentration values of dangerous substances and fertilizers in soil (OJ RS, No. 84/05)
- Decree on the Limit, Warning and Critical Concentration Values of Dangerous Substances in Soil (OJ RS, No. 68/96)
- Rules on monitoring of the input of dangerous substances and plant nutrients into the soil (OJ RS, No. 55/97)
- Regulation on burdening of the soil with waste input (OJ RS, No. 3/03)
- National Environmental Action Plan (Official Journal of the Republic of Slovenia, No. 83/99) in and Resolution on National Environmental Action Plan 2005-2012. (OJ RS, No. 2/06).
- Agricultural land act (OJ RS, No. 59/96, 31/98 in 01/99)

OJ RS = Official Journal of the Republic of Slovenia

Environmental Protection Act

Soil monitoring in Slovenia is legislated by Environmental protection act (Official Journal of Republic of Slovenia, 1993, 2004, 2006), in Article No. 96. – environmental monitoring:

- The State shall carry out monitoring of natural phenomena, state of the environment and environmental pollution.
- The monitoring of natural phenomena shall include monitoring of meteorological, hydrological, erosion, geological, seismological, radiological and other geophysical phenomena.
- The monitoring of the state of the environment shall include monitoring of soil and air quality and of biological diversity.
- The monitoring of the environmental pollution shall include monitoring of emissions into soil, water and air.

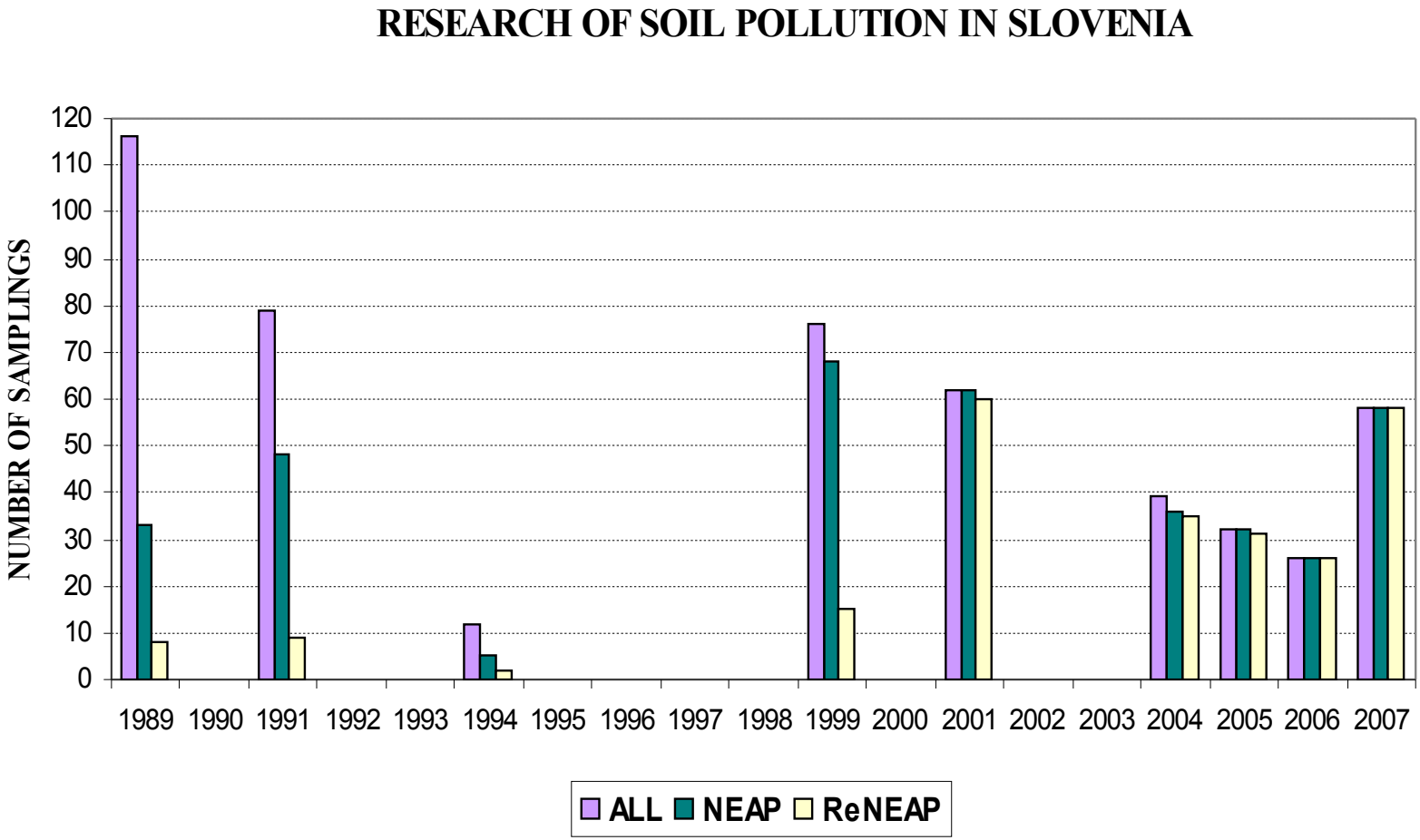
~~**SOIL POLLUTION MONITORING IN THE REPUBLIC OF SLOVENIA**~~

Decree on soil pollution monitoring

National Environmental Action Plan

- was adopted at the governmental level in 1999 and a Resolution on National Environmental Action Plan in 2006
- the NEAP set out the goals, guidelines and strategy for environmental protection and the use of natural resources
- the main goals are to prevent further chemical and physical contamination and to perform remedial actions where necessary and feasible,
- detailed action plan for the next period (2005-2012) is established including:
  - preparation of legislation concerning the soil immission monitoring on State level (National monitoring programme);
  - adoption the Codes of good agriculture practice according the Nitrate directive;
  - proceeding of the assessment of soil pollution (quality);
  - establishing soil information system on State level;
  - prevention measures including education and training.

Soil pollution assessment 1989 - 2007



Data availability

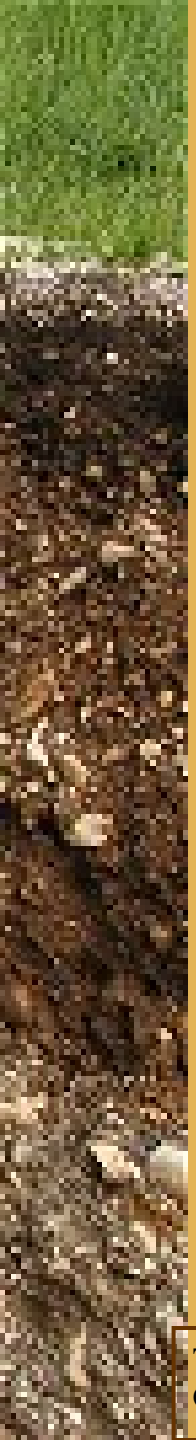
- data are collected at the Environmental Agency of the Republic of Slovenia (EARS),
  - this data are also part of data collection of Infrastructural center for Soil and Environmental Science within Network of research infrastructual centers of University of Ljubljana
- database on soil at EARS is under development (Oracle, SDE, GIS),
- reports are available on the Internet, other data on request,
- reporting to EEA – not obligatory, Slovenia does not report, since the requested data is reffering to local contaminated sites (register is not established jet)

Future actions

- comparison of so far existing methodology for soil quality assessment in Slovenia (ROTS, 2000) which should be harmonized regarding the EU guideline (overview of soil , harmonization of reference methods for parameters, equipment and holders of activity),

- elaboration of framework programme of sampling regarding ReNEAP objectives (from assessment to monitoring),

- to compile and implement Decree (Rules) on soil pollution monitoring.



The following should be done:

Inclusion of contents according to EU legislation:

- monitoring establishment and defining operative method and form of reporting for state and EU purposes,
- soil information system and its inclusion in others (GIS) national and EU information systems,
- proposal of remediation measures for most endangered areas,
- implementation of remediation actions.

ORGANIC MATTER IN SLOVENIAN SOILS

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http://www. bf.uni-lj.si

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M. Šporar, F. Lobnik

Slovenian Forestry Institute,
Večna pot 2,
1000 Ljubljana, Slovenija
http://www.gozdis.si

M. Kobal, M. Urbančič, K. Eler,
P. Simončič

Agricultural institute of Slovenia,
Hacquetova 17
1000 Ljubljana, Slovenija
http://www.kis.si

J. Sušin, B. Vrščaj

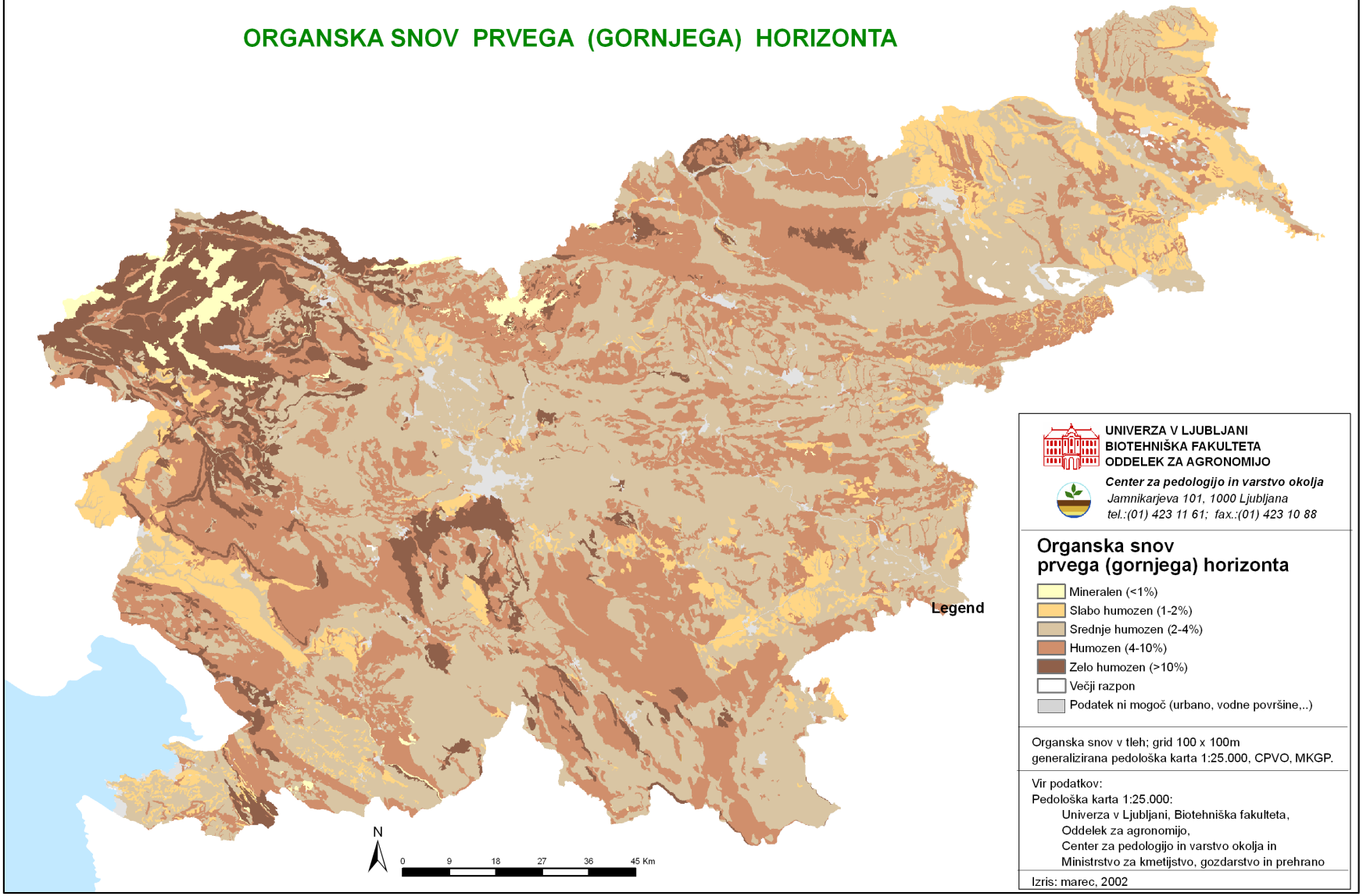
SLOVENIJA

Total area: 20.273 km^2

- 10% lowlands
  18% with valleys
- 8,7 % arable land
- 15 % permanent pastures
- 60 % woodland
- 44% karstic territory

Slovenia is small county with high diversities: several soil types with different physical, chemical and biological properties; climate; hydrological and geological conditions.

ORGANSKA SNOV PRVEGA (GORNJEGA) HORIZONTA



UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
ODDELEK ZA AGRONOMIJO
Center za pedologijo in varstvo okolja
Jamnikarjeva 101, 1000 Ljubljana
tel.:(01) 423 11 61; fax.:(01) 423 10 88

Organska snov prvega (gornjega) horizonta

- Mineralen (<1%)
- Slabo humozen (1-2%)
- Srednje humozen (2-4%)
- Humozen (4-10%)
- Zelo humozen (>10%)
- Večji razpon
- Podatek ni mogoč (urbano, vodne površine,..)

Organska snov v tleh; grid 100 x 100m
generalizirana pedološka karta 1:25.000, CPVO, MKGP.

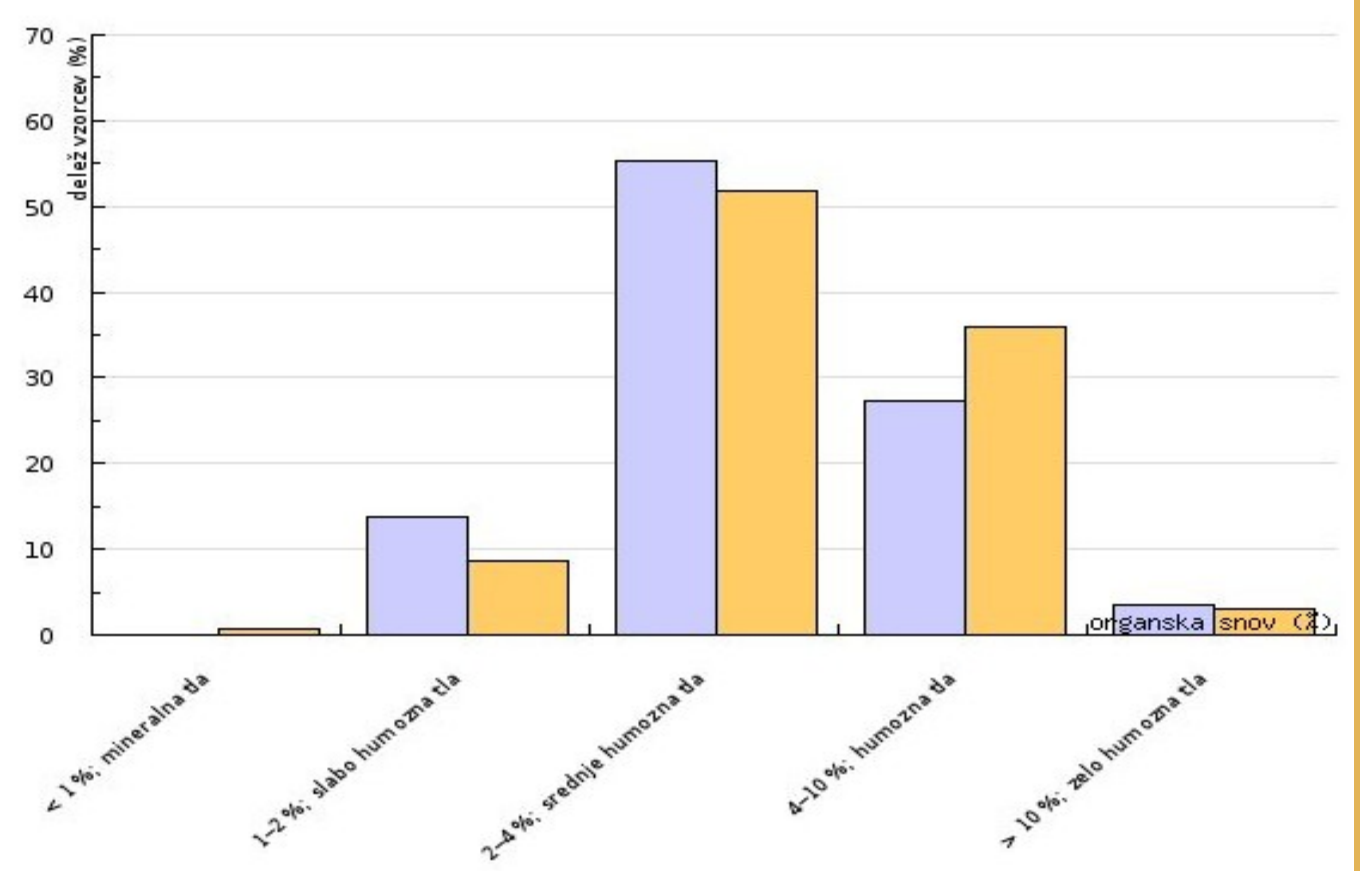
Vir podatkov:
Pedološka karta 1:25.000:
Univerza v Ljubljani, Biotehniška fakulteta,
Oddelek za agronomijo,
Center za pedologijo in varstvo okolja in
Ministrstvo za kmetijstvo, gozdarstvo in prehrano

Izris: marec, 2002

ORGANIC MATTER CONTENT IN SLOVENIAN SOILS (% OM)

Soil depth (cm)	Soil organic matter (%)				
	SOIL POLLUTION ASSESSMENT*		SOIL FERTILITY PROGRAM**		
	grassland	arable	grassland	arable	plantations
0-5	11,2	3,9	5,7 – 9,1	3,4 – 3,7	2,3 – 3,2
5-20	6				
20-30	3,4				

* Zupan et. al, 2008 ** Sušin et al., 2007



- Humid climate
- Land use (grasslands)
- Organic fertilizer

SOIL ORGANIC MATTER CONTENT (%)	AGRICULTURAL LAND USE (topsoil)	
	Soil inventory	Fertility control
> 2	86,2 %	90,7 %
> 4	30,9 %	39,0 %

Sušin & Vrščaj, 2007

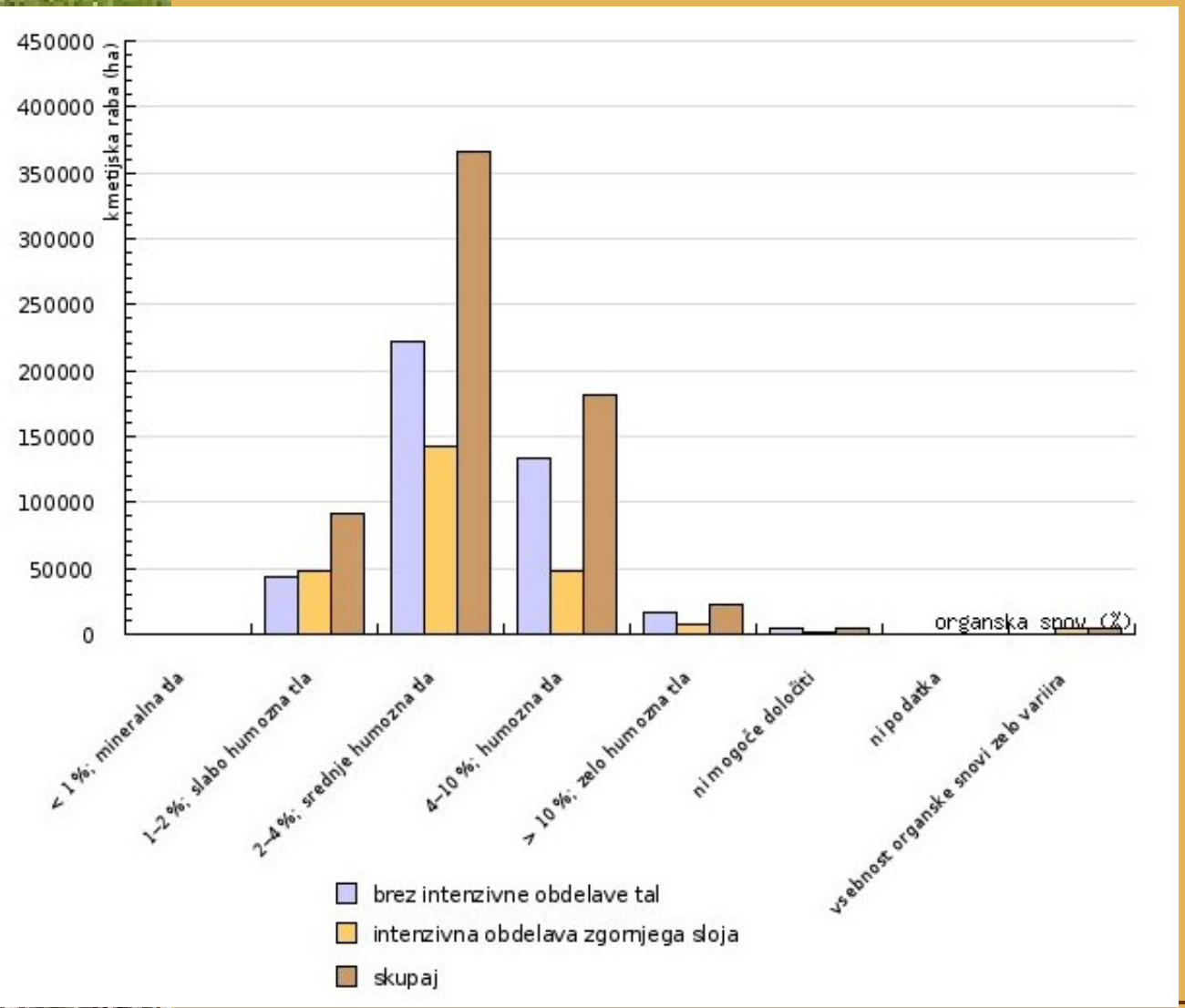
CARBON STOCK IN SLOVENIAN SOILS (t/ha)

- 886 soil profiles (national soil inventory and BIOSOIL project)
- for bulk density PTF ware used (% clay, % Corg.)

Land use	CARBON STOCK (t/ha)		
	Organic part	Mineral part	Together
ARABLE	0	164	164
FORESTS	5,6	150	155,6
PASTURES	3,4	150	153,4
MEADOWS	2,8	143	145,8

Kobal et al., 2007

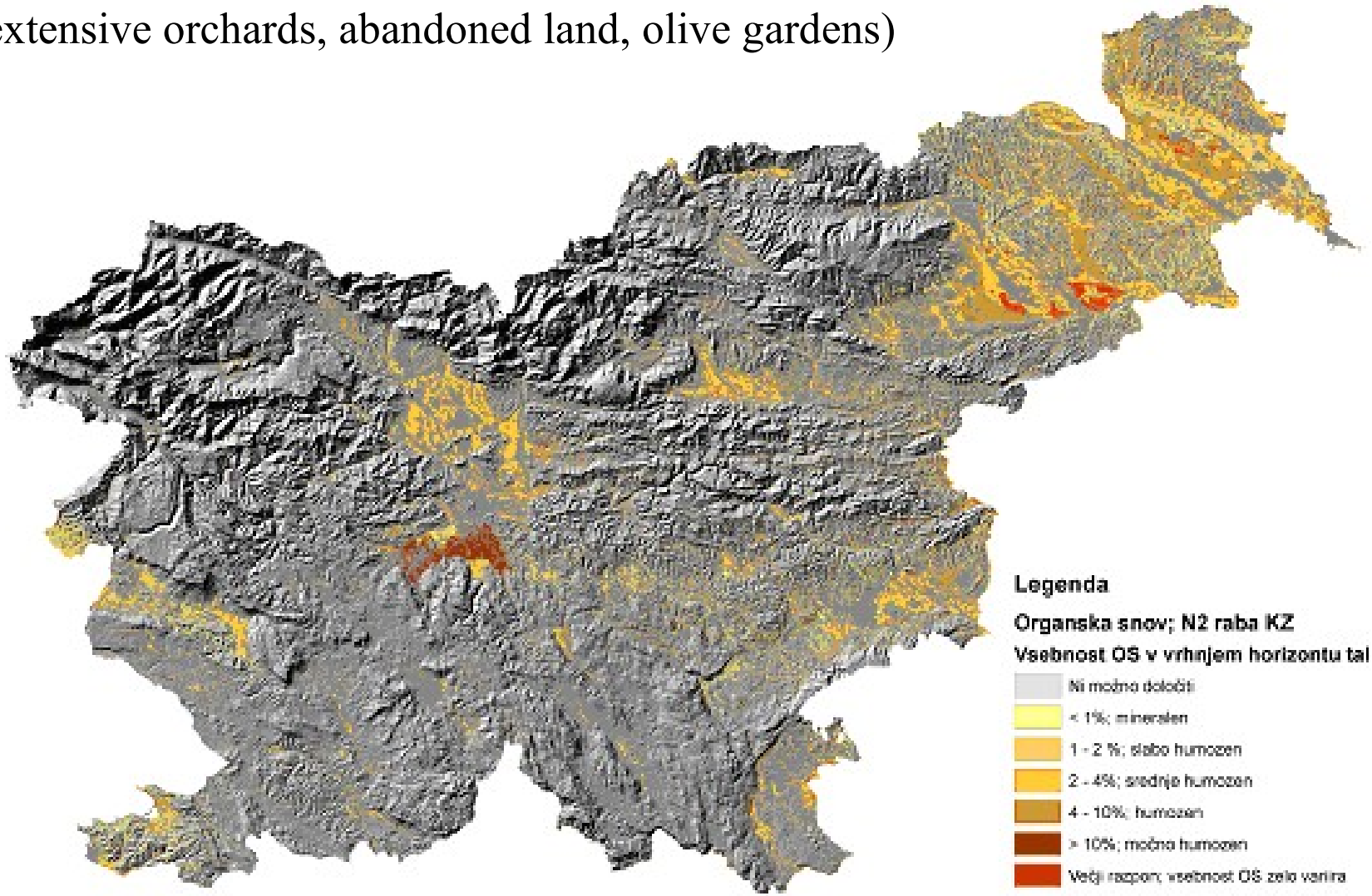
IMPACT OF SOIL CULTIVATION ON SOIL ORGANIC MATTER CONTENT



WITHOUT INTENSIVE CULTIVATION	extensive orchards, aban-doned land, olive gardens
INTENSIVE CULTIVATION (PLOUGHING)	fields, gardens, planta-tions (hop, grape, fruit)

Sušin & Vrščaj, 2007

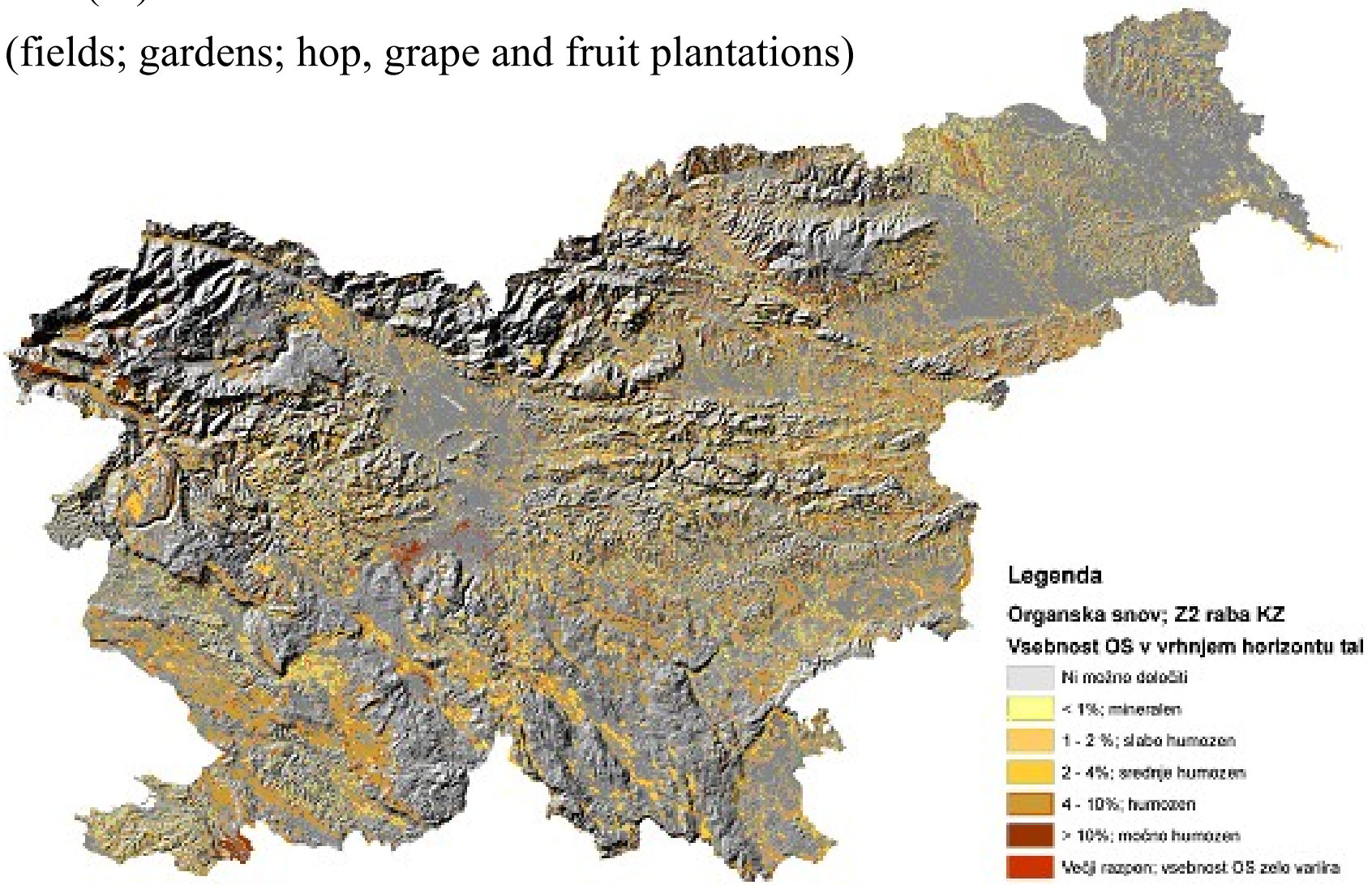
OM (%) in SOILS WITHOUT INTESIVE CULTIVATION (extensive orchards, abandoned land, olive gardens)



Sušin & Vrščaj, 2007

OM (%) in SOILS WITH INTESIVE CULTIVATION

(fields; gardens; hop, grape and fruit plantations)



Sušin & Vrščaj, 2007

Thank you for your attention!