REPUBLIKA SLOVENIJA
MINISTRSTVO ZA KMETIJSTVO,
GOZDARSTVO IN PREHRANO

PROGRAM RAZVOJA PODEŽELJA

REPORT ON THE UPDATED DELIMITATION OF AREAS FACING NATURAL CONSTRAINTS AND OTHER SPECIFIC CONSTRAINTS IN THE REPUBLIC OF SLOVENIA

9ND JANUARY 2019

EKSRP

Evropski kmetijski sklad za razvoj podeželja: Evropa investira v podeželje

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1. Introduction

Pursuant to Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD), Member States shall designate areas facing natural and other specific constraints on the basis of the eight common biophysical criteria. An area shall meet the criteria for ANCs (areas with natural and other specific constraints) if at least 60% of agricultural areas meet any of the following biophysical criteria:

- low temperature,
- dryness,
- excess soil moisture,
- limited soil drainage,
- unfavourable texture and stoniness,
- shallow rooting depth,
- poor chemical properties, and
- steep slope.

The report presents the procedure for using the common biophysical criteria to define natural constraints in agriculture in Slovenia. All areas in the country outside of the mountain area have been verified. Therefore, pursuant to the valid delimitation arising from the 2014–2020 Rural Development Programme (hereinafter: PRP 14–20), the analysed area includes:

- other areas with natural constraints (hereinafter: other ANCs),
- areas with specific constraints (hereinafter: specific ANCs) and
- areas not included in an ANC.

The application of 8 biophysical criteria and procedures for delimiting ANCs are mainly based on the following expert documents of the European Commission:

- Van Orshoven J., Terres J.M., Toth T. 2014. Updated common biophysical criteria to define natural constraints for agriculture in Europe. Definition and scientific justification for the common biophysical criteria. Report EUR 26638 EN, EC JRC, 67 pages,
- Terres J.M., Hagyo A., Wania A. 2014. Scientific contribution on combining biophysical criteria underpinning the delineation of agricultural areas affected by specific constraints. Methodology, Factsheets for plausible criteria combinations. Report EUR26940 EN, EC JRC, 81 pages,
- Terres J.M., Hagyo A., Wania A. 2016. Updated guidelines for applying common criteria to identify agricultural areas with natural constraints. EN, JRC, 43 pages.

2. The current delimitation of areas with natural and other specific constraints in Slovenia

The situation in Slovenia

Slovenia is among the EU-28 countries with the highest proportion of agricultural areas in areas with natural or other specific constraints, which reduces the competitiveness of Slovenian agriculture, limits the selection of possible production orientations, and increases production costs. This leads to the abandonment of agriculture in these areas, the overgrowing of agricultural areas, and the loss of biodiversity and agricultural landscape. The cultural landscape in ANCs is still very dependent on agriculture. The maintenance of farming is thus essential for the long-term preservation of the environment and countryside. The long-term availability of natural resources is a basic condition for the implementation of numerous functions in ANCs. Reducing the quantity and quality of natural resources impacts the functioning of this living space, economic territory for locals and also the area for the recreation and relaxation of the population living outside these areas.

The currently valid delimitation of LFAs (hereinafter ANCs) in Slovenia arises from the 2007–2013 Rural Development Programme:

- mountain areas,
- other LFAs,
- areas affected by specific handicaps.

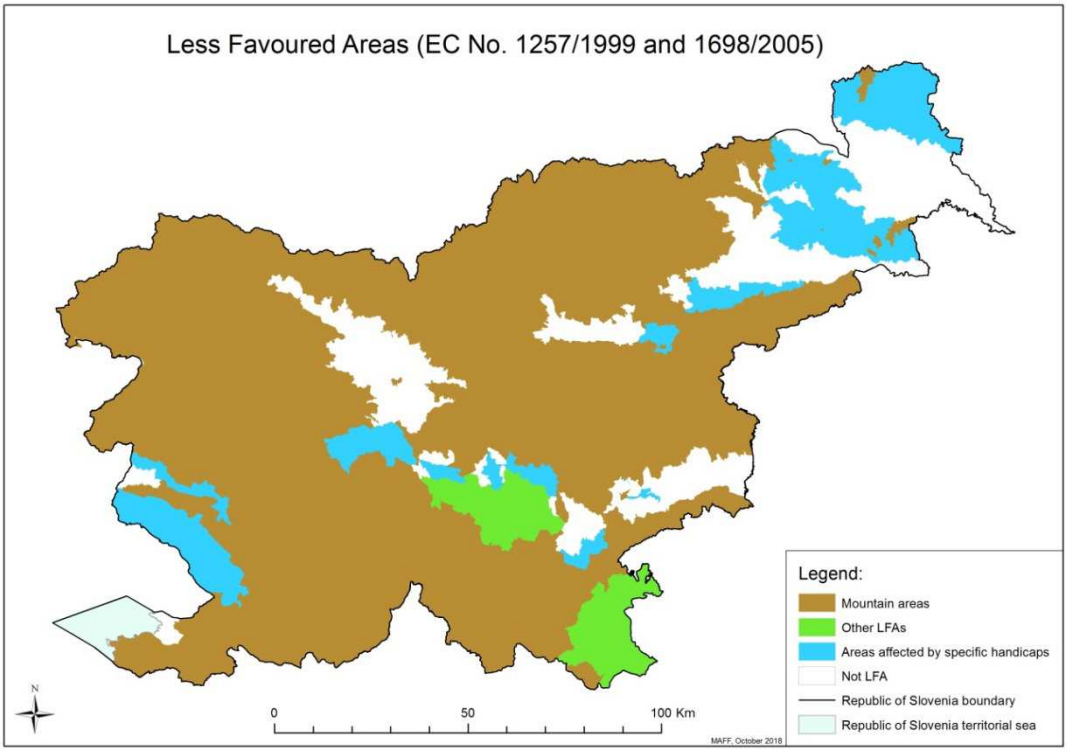


Figure 1: Less favoured areas for agricultural activity in Slovenia

The strong biological and geomorphological diversity of Slovenia's territory is also seen in the current delimitation of ANCs in Slovenia. Mountain areas cover 72% of the country, which accounts for no less than 55% of agricultural areas and approximately 34,000 agricultural households.

Other ANCs cover 4% of the country, i.e. 4% of agricultural land and approximately 2,500 agricultural households.

Specific ANCs cover 10% of the country, i.e. 16% of agricultural land and approximately 9,500 agricultural households.

14% of the country's territory with approximately 25% of agricultural areas is not included in any area facing natural constraints for agriculture. These areas are mainly found in the alluvial gravel plains of the Sava Plain, the Krško and Brežice Plain, the Savinja Plain, the Drava Plain, and the Mura Plain.

The procedure for delimiting ANCs in Slovenia by using the administrative unit of a cadastral municipality

Cadastral municipalities have been used in Slovenia as basic administrative units for delimiting areas since 2004, through three programming documents; the procedure itself is described in detail in the 2004–2006 Rural Development Programme, which was adopted and confirmed by the European Commission by way of Commission Decision No CCI 2004 SI 06 KDO 00 of 24 August 2014 confirming the programming document dealing with rural development in the Republic of Slovenia in the 2004–2006 programming period:
"The basic territorial unit for delimiting ANCs is a cadastral municipality. Cadastral municipalities in Slovenia have been a part of the cadastral system since the land cadastre was established. All of Slovenia is covered with a total of 5,190,600 land plots divided among 2,698 cadastral municipalities. A cadastral municipality is the basic unit for managing the Land Cadastre, and each of them is given an official name, code, and spatial identification. The smallest unit of the cadastral system is a cadastral land plot, which is connected to the cadastral municipality. Cadastral land plots have been kept up until today, and now they are included in the Slovenian Geographic Information System; the data on these plots is kept by the Surveying and Mapping Authority of the Republic of Slovenia."

The new delimitation presented in this document envisages the usage of LAU2.

3. Information on data sources used

3.1. Climate data

In the procedure for verifying the eight biophysical criteria for delimiting other ANCs and specific ANCs, the criteria ‘low temperature’ and ‘dryness’ were verified with the help of meteorological data. The task of verifying climate criteria was carried out by the Biotechnical Faculty on the basis of a public contract titled Climate Factors as Additional Criteria for Areas Facing Natural and Other Specific Constraints.

The ‘low temperature’ criterion (growing season length and temperature sum) is significant from the agricultural perspective because low temperatures limit growth and development by affecting important physiological processes, such as photosynthesis and the growth of leaves. Low temperatures are defined as a condition limiting the survival or productivity of plants through temperatures that are not sufficient for optimum growth and development. The ‘dryness’ criterion is an important limiting factor affecting the growth and development of crops, and it indicates a lack of precipitation lasting multiple years as well as great evapotranspiration.

The climatic limiting factors encompass the length of the growing season, temperature sums for a growth season, and the drought stress of plants, i.e. three of a total of eight proposed biophysical criteria.

The data from the meteorological measurements performed by the Slovenian Environment Agency for the 1981–2010 period at 29 meteorological stations that measured all of the required basic climatological variables during this period was used. On the basis of this data, the spatial interpolation of the measurements and the data was performed, taking into account the dynamic nature of Slovenia's relief. The spatial interpolation was carried out using the general kriging method taking into account elevation; the method was implemented in the GSTAT geostatistical package.

The results of the applied climatological data and the spatial interpolation showed that only the Rateče meteorological station located in a mountain area meets the ‘low temperature’ criterion. No meteorological station in Slovenia meets the ‘dryness’ criterion.

For this reason, the meteorological parameters and the information obtained were not used for delimiting other ANCs and specific ANCs below.

3.2. **Pedologic data**

The criteria and their limit values were determined by reviewing and analysing the following data sources:

- A digital soil map of Slovenia in the scale of 1:25,000 (abbreviated: SM25).
- A digital soil profile database (abbreviated: SPD). The database contains data on the location of a soil profile, descriptions of horizons, and the standard set of measured analytical data by horizon.
- The Soil Information System of the Infrastructure Centre for Pedology and Environmental Protection (abbreviated: the TIS/ICPVO system).

Digital pedologic map of Slovenia, 1:25,000 – General

The digital soil map of Slovenia includes a graphic depiction of soil mapping units (i.e. soil mapping unit, abbreviated: SMU), excavated profile sites, and the descriptions and analytical data on the excavated profiles. The soil mapping unit is a basic cartographic unit of a soil map. It consists of one or more soil typological units (abbreviated: STU), which typically appear together in nature and cannot be depicted separately due to the map's scale. The SM25 of Slovenia makes up 1022 different SMUs, and the total number of SMUs in the entire territory of Slovenia is 10,782.

The soil typological unit (STU) is a soil unit (=soil type) in a particular classification system with typical properties that significantly differ from the properties of other soil types (other soil typological units). The soil map has cartographic units consisting of one, two, or three soil typological units, and it can also have one inclusion. Soil typological units cover a specified proportion of the area within a soil map unit (a total of 100%), while an inclusion does not have a specified proportion. Soil typological units are defined by the corresponding (if possible within SMU) excavated profiles, and while some STUs were defined by way of a description on the basis of soil drilling test and no quantitative analytical measurements were performed. The locations of soil profiles have an unequal spatial distribution depending on geologic and soil properties diversity. Not all mapping units have profiles; in order to provide suitable interpretation, the excavated profiles of a relevant SMU as well STU are taken into account.

Slovenia has very heterogenous soil-forming factors (bedrock, climate, topography), so many SM25 mapping units consist of a larger number of soil types or soil typological units (STUs); combined mapping units also cover the largest area, both within Slovenia's total area or within agricultural areas (Grčman et al, 2015). In total, 943 STUs are defined on the SM.

Profiles are described by determining soil horizons and their depth, followed by the determining their colour, structure, consistency, moisture, excessive root growth, skeleton, and potential special features. Analytical data contain pH measurements, proportions of sand, silt, and clay, plant available phosphorus and potassium, organic matter and organic carbon, total nitrogen, as well as the measurements of total exchangeable acidity, and exchangeable calcium, magnesium, potassium, and sodium cations. The carbon-to-nitrogen (C/N) ratio, cation-exchange capacity, and base saturation were calculated. Standard methods for soil studies and analytical procedures, mostly modified methods of the International Standards Organisation (ISO) and partly of the Austrian Standards Organisation (ÖNORM), were used for descriptions and analytical procedures.

Data for the analysis of the eight biophysical criteria were extrapolated from the Digital SM25 (1:25,000) and from the Soil Information System (TIS system)

The data extrapolated from the Soil Information System for the purpose of delimiting ANCs was prepared by the University of Ljubljana, Biotechnical Faculty, Department of Agronomy, Infrastructure Centre for Soil and Environmental Science, on the basis of Agreements No 2330-16-310017 and No. 2330-17-0000697, taking into account the instructions from the Updated Guidelines (Terres et al, 2016).

When preparing the extrapolated data, the soil scientists of the Biotechnical Faculty also relied on other available resources of the Soil Information System at the Infrastructure Centre for Soil and Environmental Science, such as research and expert projects (such as the Update of the Soil Map, 2015; Research of Soil Pollution in Slovenia, 1999–2014).

Furthermore, data from the SM25 were verified in the field in 2017 in selected part of the studied area (Bela Krajina, Suha Krajina) with the purpose of improving the accuracy of the data used for treating soil mapping units (depending on the situation in the field). An additional review and corrections of attribute data were mainly needed from the perspective of the coarse fragments percentage, skeleton percentage and proportion outcrops. In the existing attribute database, there was limited information about coarse fragments percentage and outcrops, or those parameters, because it was not recorded in the profile descriptions, or was not transferred in the soil profile digital database. Work was performed by means of the classic field method of reviewing (reconnaissance) larger agricultural areas. Moreover, soil test boring and excavations were also selectively performed. Individual observations were documented by the way of photographs, descriptions from the field, and coordinates in a Gauss-Kruger coordinate system. On the basis of the

observations from the field, reviewed areas, and laboratory analysis, the soil map was updated. Most of the corrections refer to the modification of the structure of the soil map unit due to the adaptation of a soil typological unit or their proportions in the SMUs.

An expert assessment, the use of soil profile data (hereinafter: SPD), and computer-assisted modelling were used as the basic methodology for the work performed by a working group of experts from the field of soil mapping/pedologic and GIS specialists.

The extrapolated data were prepared by the Biotechnical Faculty in two forms:

1) A unique designation was determined for each soil map unit stating whether a SMU as a whole meets or fails to meet a particular criterion. A SMU meets a criterion if it fulfils it in at least 60% of the area. If there is a large degree of variability within a SMU (when a criterion is met in 50% of the SMUs area), the SMU was given the special designation ‘big variety.’
2) The percentage of the SMU area in which a particular criterion is met is determined for each soil map unit. The percentage is equal to one percent of one STU or a sum of the percentages of multiple STUs that meet a particular criterion within a particular SMU.

In the entire procedure for delimiting areas facing natural or other specific constraints, Slovenia used the data format described in Point 2, i.e. the soil map in which the soil association concept is used (Soil map using Soil Association concept).

Figure 2a and 2b show a chart indicating the course of the use of the data from the SM25 and Soil Information System (TIS) for the purpose of the expert assessment and the decision which SMUs have the properties that comply with the properties necessary to determine a particular criterion for constraint.

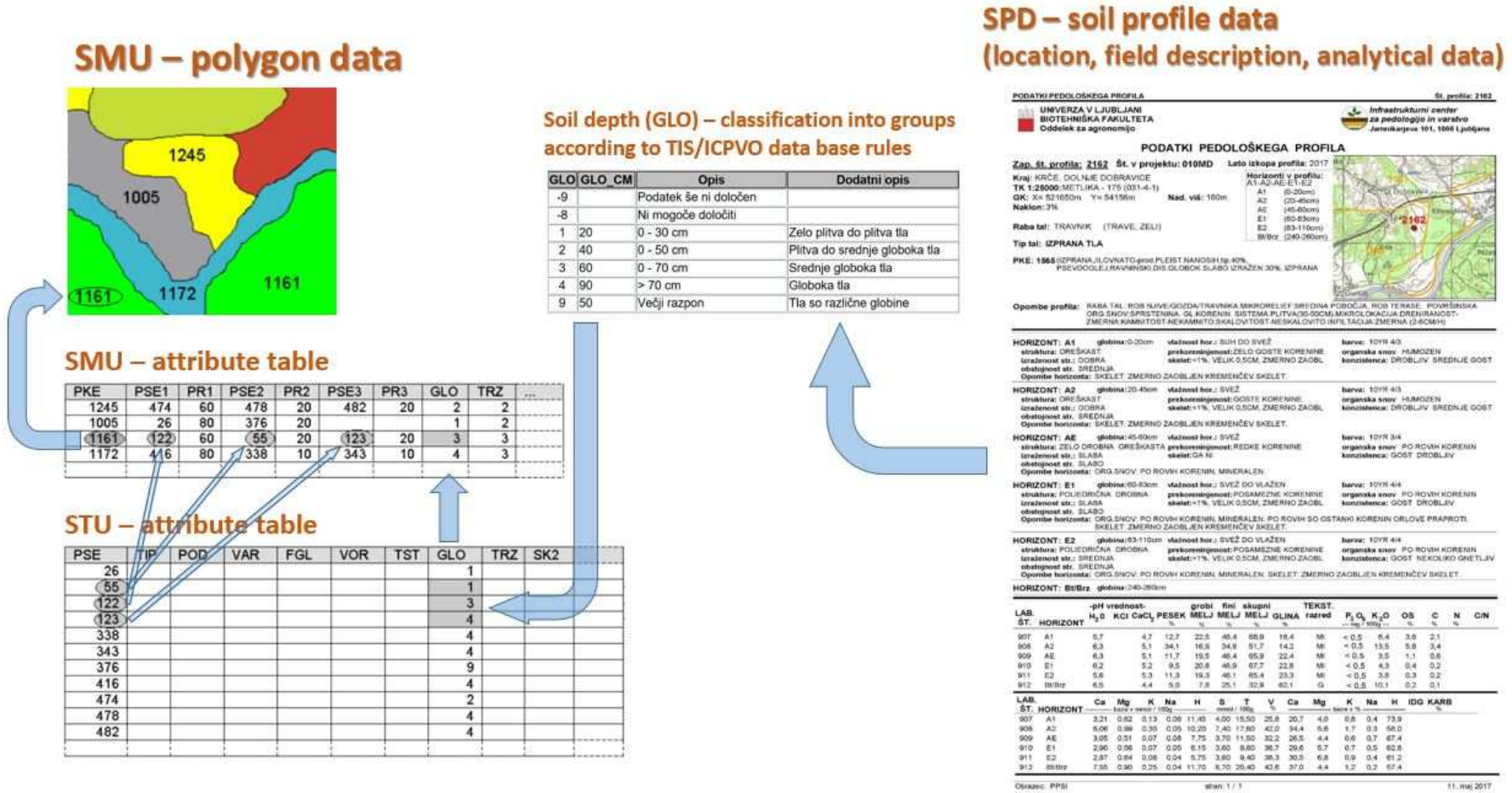


Figure 2a: The graphic part of the digital soil map (polygons of soil map units – SMU) is complemented by the attribute tables on SMU structure (to what extent and in what proportion soil typological units, STUs, are represented) and on the properties of STUs. The properties of STU and SMUs are provided for particular soil properties in categories depending on the criteria of the TIS/ICPVO system and the Slovenian Soil Classification; they arise from the described and measured data regarding soil profiles (SPDs).

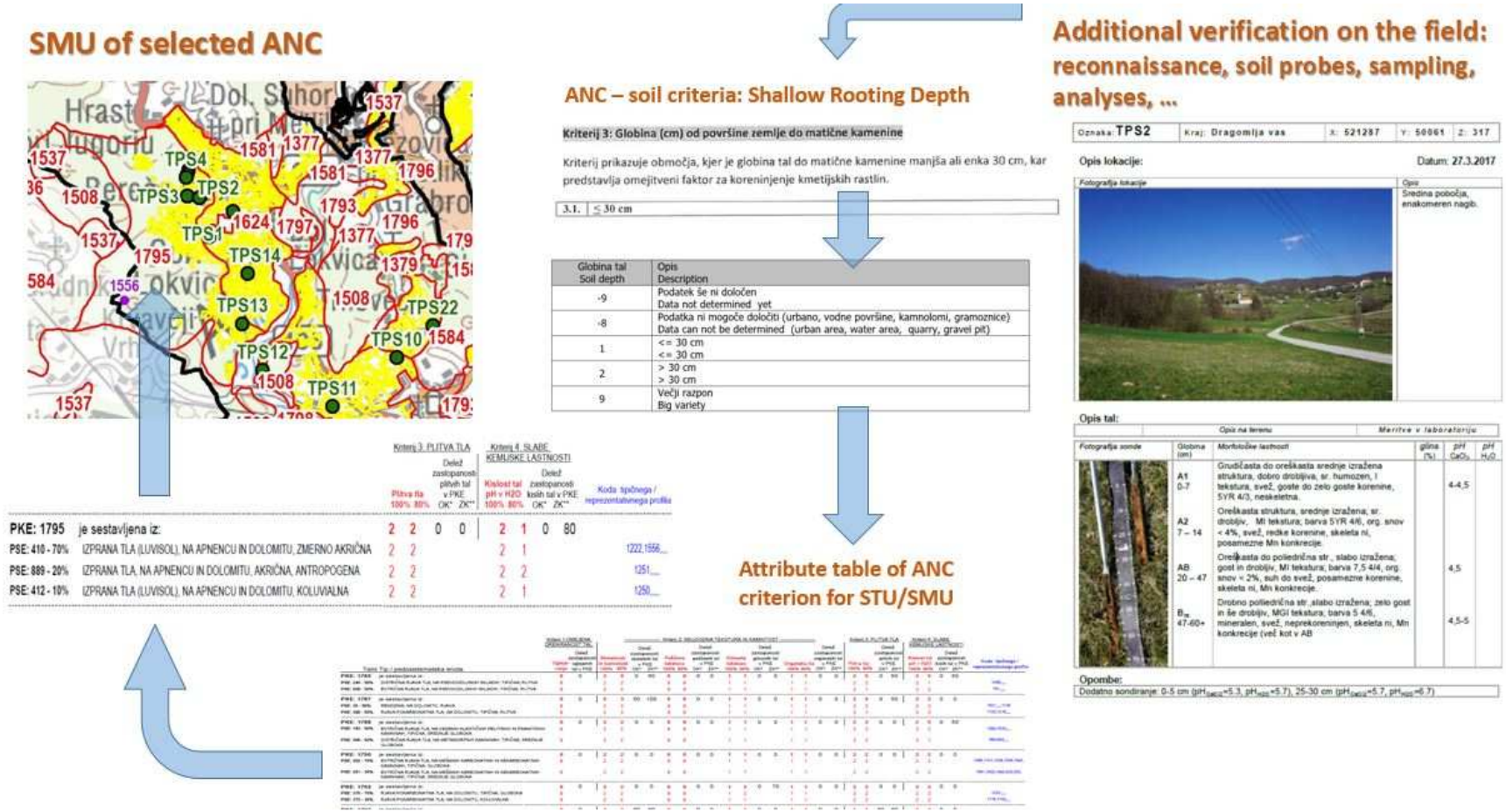


Figure 2b: Using the data on soil properties (attribute STU table), the data was recalculated for soil mapping units (attribute SMU table) depending on the proportion of the representation of individual STUs in a SMU. This report shows only an example for determining the piece of attribute data ‘SOIL DEPTH’ and derivation of the ANC criterion ‘SHALLOW ROOTING DEPTH’.

4. Criteria evaluation methods

Criteria and sub-criteria relevant for Slovenia and used within the ANC delimitation are presented in detail in chapters 4.1 to 4.5.

Each criterion in chapter 4.1 to 4.4 is described and presented with a special map, individually and with no interaction with other criteria. Procedure defined in the Updated Guidelines of JRC (Terres et al., 2016, pp 29 and 32-33) has been used in the ANC delimitation. Therefore, the proportion of STU in the SMU used for criteria and threshold is presented with different colours within special maps.

Maps and descriptions thereof in chapters 4.1 to 4.5 are in accordance with "Workflow of the mapping of ANC for agriculture - STEP 1: Mapping of constraints at original dataset resolution (Updated Guidelines of JRC (Terres et al., 2016, pp 29).

4.1. Criterion: Limited soil drainage

Reduced soil drainage is the result of limited water drainage throughout most of the year. Limited soil drainage may also be a result of a high level of groundwater or stagnant rain or flood water.

Because Slovenia usually has two precipitation maximums (in spring and autumn) the excessive water may cause constraints for sowing and produce storage. The sources of excess moisture are rainwater and groundwater. Slope runoff water may also become stagnant for longer periods in the vicinity of sink holes. Runoff water becoming stagnant on the surface of the soil for a shorter period usually does not affect changes in the soil. Water that is stagnant for a longer period cause grey zones in the upper section of the soil profile. Their presence is the main criterion for limiting the usability of soil for agriculture.
Excessive moisture usually occurs in texturally heavy soil (greater proportion of clay) and sometimes in cases when soil consists of a combination of clay and silt.

One of the following three indicators is used to delimit these areas:

1. Soil that is wet at a depth of 80 cm for more than six months;
2. Soil with poor or very poor water drainage;
3. Gleyic colour pattern within 40 cm from the surface.

The indicator 'gleyic colour pattern within 40 cm from the surface' was most frequently used in Slovenia to determine areas facing limited soil drainage.

Soil gleisation due to rainwater is called normal pseudogleisation. It occurs due to texturally unfavourable conditions with clay and silt. The compact grey-brown

(yellow) mottled Bg horizon is formed, which is typical of pseudogleisation. It is compact and hard when dry, usually there are also dark manganese coatings and corrections. It is spreadable and kneadable when wet. Pseudogley is very sensitive to erosion processes, even on light slopes. The depth and prominence of the Bg horizon serve to indicate limited usability of the soil for agriculture.

Due to a high level of groundwater, gleisation usually occurs at the lowest points of the relief. Groundwater is retained by impermeable bedrock (rocks or clay deposits). In heavy precipitation, the groundwater level rises, and in dry periods it drops. In areas where groundwater levels fluctuate, a typical grey-brown mottled pattern, i.e. the Go horizon, appears in the soil. In areas with permanent groundwater retention, the grey soil is designated as the Gr horizon. The depth and prominence of the colour shades in both of these horizons are a criterion for limited adequacy for agriculture.

Methodology

In the process of determining SMUs that meet the criterion 'limited soil drainage,' all of the STUs represented in the country's territory outside of mountain areas were reviewed; they were given the attribute YES or NO, depending on the presence of gleyic horizons Go and Gr (gleyic soil properties) or horizons Aa and Bg or just g horizons with stagnant water (stagnic soil properties). Mainly gleyic soils (Gleysols – WRB, 2014) and pseudogleys (stagnosols and planosols – WRB, 2014) meet these criteria.

For STUs that meet the criterion, specific morphologic descriptions of selected representative soil profiles were used in addition to the general soil properties (soil classification and regulation based on classifying and naming soil depending on diagnostic horizons). It had to be evident from the soil profile description that these horizons appear at a depth of <=40 cm under the surface. Below is an example of one of the representative soil profiles with horizon designations (Figure 3).

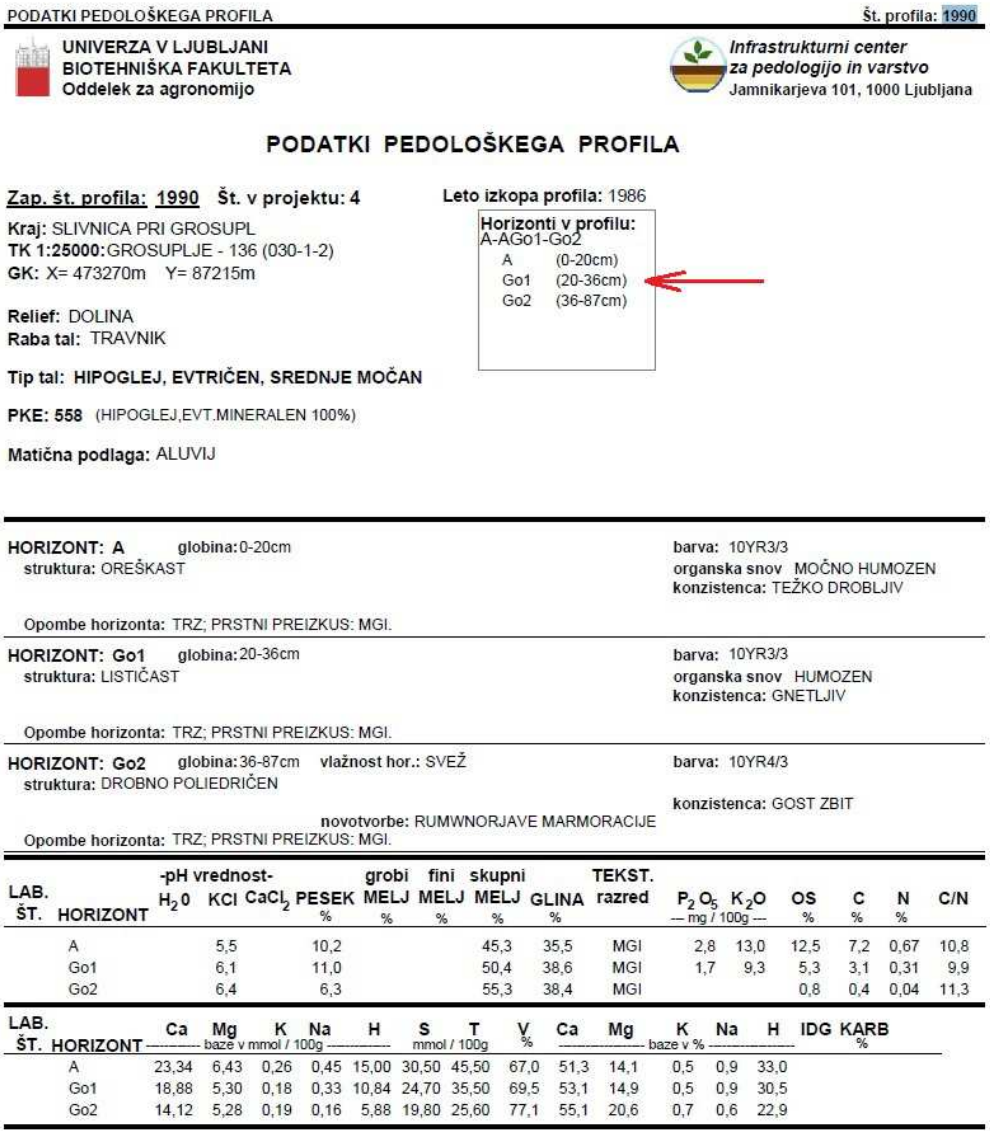
According to Slovenian national soil classification Go and Gr are horizons of Gley soil type developed due to underground water usually in hydraulic equilibrium with nearby water stream. Label Aa is used to distinguish a specific A horizon with a wet humus form similar to moder humus of dry terrestrial soils. Stagnant water (usually rain water) is forming Pseudogley (national soil classification), some of them correspond to Planosols or Stagnosols (WRB). They have usually an "ordinary" A (even Ap) horizon followed by g or Bg horizon.

SI was completely followed by the JRC remark from December 2018, and therefore, only Soils with Go or Gr horizon within 40 cm are taken into account. The soil with horizons Aa, Bg or g was removed from the delimitation.

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present	Proportion of the total surface with the criterion
20	858	172	0
30	4,755	1,426	2
40	736	294	0
50	2,703	1,352	2
60	2,540	1,524	2
70	52	36	0
80	927	742	1
100	70,978	70,978	93
Surface area	83,549	76,524	100

Table 1: Surface of land at the SMU level, where the 'gleyic colour pattern is within 40 cm from the surface'[1]

[1] The column 'Proportion of SMU meeting the criterion' shows the proportion of the SMU in which the criterion 'gleyic colour pattern within 40 cm from the surface' is present. The column 'Total SMU surface where the criterion is present (ha)' shows the total surface of SMUs with individual proportions of the criterion. The column 'Surface where the criterion is present' shows the actual surface, taking into account the proportion of the SMU meeting the criterion. The column 'Proportion of the total surface with the criterion' shows the proportion of the actual surface of a particular criterion compared to the actual total surface area. The structure of the tables is the same for all criteria subject to this report.



PODATKI PEDOLOŠKEGA PROFILA Št. profila: 1990

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 1990 **Št. v projektu: 4**

Leto izkopa profila: 1986

Kraj: SLIVNICA PRI GROSUPL
TK 1:25000: GROSUPLJE - 136 (030-1-2)
GK: X= 473270m Y= 87215m

Horizonti v profilu:
A-AGo1-Go2
A (0-20cm)
Go1 (20-36cm)
Go2 (36-87cm)

Relief: DOLINA
Raba tal: TRAVNIK

Tip tal: HIPOGLEJ, EVTRIČEN, SREDNJE MOČAN

PKE: 558 (HIPOGLEJ,EVT.MINERALEN 100%)

Matična podlaga: ALUVIJ

HORIZONT: A **globina:** 0-20cm
struktura: OREŠKAST
barva: 10YR3/3
organska snov MOČNO HUMOZEN
konzistenca: TEŽKO DROBLJIV
Opombe horizonta: TRZ; PRSTNI PREIZKUS: MGI.

HORIZONT: Go1 **globina:** 20-36cm
struktura: LISTIČAST
barva: 10YR3/3
organska snov HUMOZEN
konzistenca: GNETLJIV
Opombe horizonta: TRZ; PRSTNI PREIZKUS: MGI.

HORIZONT: Go2 **globina:** 36-87cm **vlažnost hor.:** SVEŽ
struktura: DROBNO POLIEDRIČEN
barva: 10YR4/3
konzistenca: GOST ZBIT
novotvorbe: RUMWNORJAVE MARMORACIJE
Opombe horizonta: TRZ; PRSTNI PREIZKUS: MGI.

LAB. ŠT.	HORIZONT	-pH vrednost- H_2O	KCl	$CaCl_2$	PESEK %	grobi MELJ %	fini MELJ %	skupni MELJ %	GLINA %	TEKST. razred	P_2O_5 — mg / 100g —	K_2O	OS %	C %	N %	C/N
	A		5,5		10,2			45,3	35,5	MGI	2,8	13,0	12,5	7,2	0,67	10,8
	Go1		6,1		11,0			50,4	38,6	MGI	1,7	9,3	5,3	3,1	0,31	9,9
	Go2		6,4		6,3			55,3	38,4	MGI			0,8	0,4	0,04	11,3

LAB. ŠT.	HORIZONT	Ca	Mg	K	Na	H	S	T	V %	Ca	Mg	K	Na	H	IDG	KARB %
		baze v mmol / 100g					mmol / 100g			baze v %						
	A	23,34	6,43	0,26	0,45	15,00	30,50	45,50	67,0	51,3	14,1	0,5	0,9	33,0		
	Go1	18,88	5,30	0,18	0,33	10,84	24,70	35,50	69,5	53,1	14,9	0,5	0,9	30,5		
	Go2	14,12	5,28	0,19	0,16	5,88	19,80	25,60	77,1	55,1	20,6	0,7	0,6	22,9		

Figure 3: Example of the representative profile no. 1990, which was selected as the representative profile for STU no. 558 present in SMU no. 558: hypogley, eutric, mineral

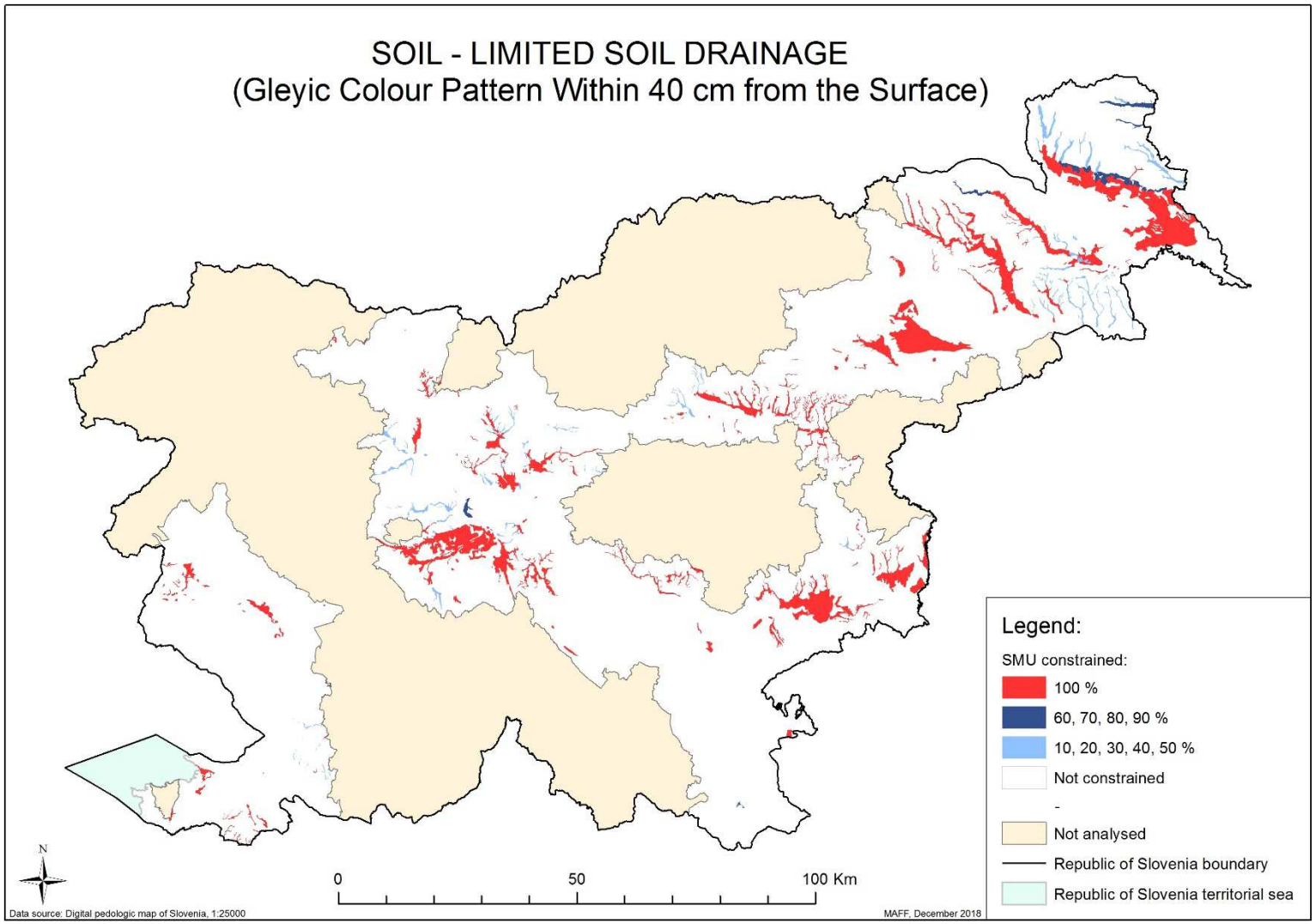


Figure 4: Limited soil drainage.

4.2. Criterion: Unfavourable texture and stoniness

The criterion may contain one or more soil properties affecting agriculture. Each relevant sub-criterion is shown separately. The following sub-criteria forming unfavourable texture and stoniness are available:

1. Coarse fragments: presence of skeletic particles (particles > 2 mm) including stones, rocks, and boulders in the topsoil layer (>= 15% by volume);
2. Texture class in half or more (cumulatively) of the 100 cm soil surface is sand, loamy sand defined as: silt % + (2x clay %) ≤ 30 %
3. Topsoil texture class is heavy clay (>= 60%) in the top soil layer;
4. Organic soil defined as organic matter (>= 30%) extends either 40 cm or more from the soil surface taken cumulatively within the upper 100 cm of the soil);
5. Topsoil contains 30 % or more clay and there are vertic properties within 100 cm of the soil surface.

In Slovenia, soil with typical vertic properties is not present, so attribute data was only determined for the first four properties of the criterion ‘unfavourable texture and stoniness.’

4.2.1. Sub-criterion: Greater presence of skeletic particles (particles > 2 mm) including stones, rocks and boulders in the upper topsoil layer (>= 15% by volume)

The stoniness of the soil encompasses an increased portion of rock skeletic material as well as rock outcrops and boulders. In particular, stoniness in the form of coarse material, rock outcrops, and/or boulders is present on karst surfaces, which are predominant in Slovenia covering an area of no less than 40% of the country. The analysed area also includes karst surfaces, so it can be stated that stoniness is the most important and most frequent limiting criterion treated within the analysis for determining ANCs.

The properties and constraints of karst surface are also evident in the structure of the use of agricultural land. Extensive permanent pastures are predominant, there are few fields, arable land is located at the bottom of sinkholes (dolines). Mechanised use is very limited to the use of small machines. In the past, farmers often cleared rock outcrops on mowed grasslands and removed the stones to the edges of agricultural areas. Regardless of the removal of surface coarse material, the stoniness in this area is above average, constituting a constraint for farming, both from the perspective of limiting use to only grasslands as well as from the perspective of causing a reduced volume of water-retaining soil.

Stoniness and rock outcrops are a significant limiting factor for agriculture in karst terrain.

Methodology

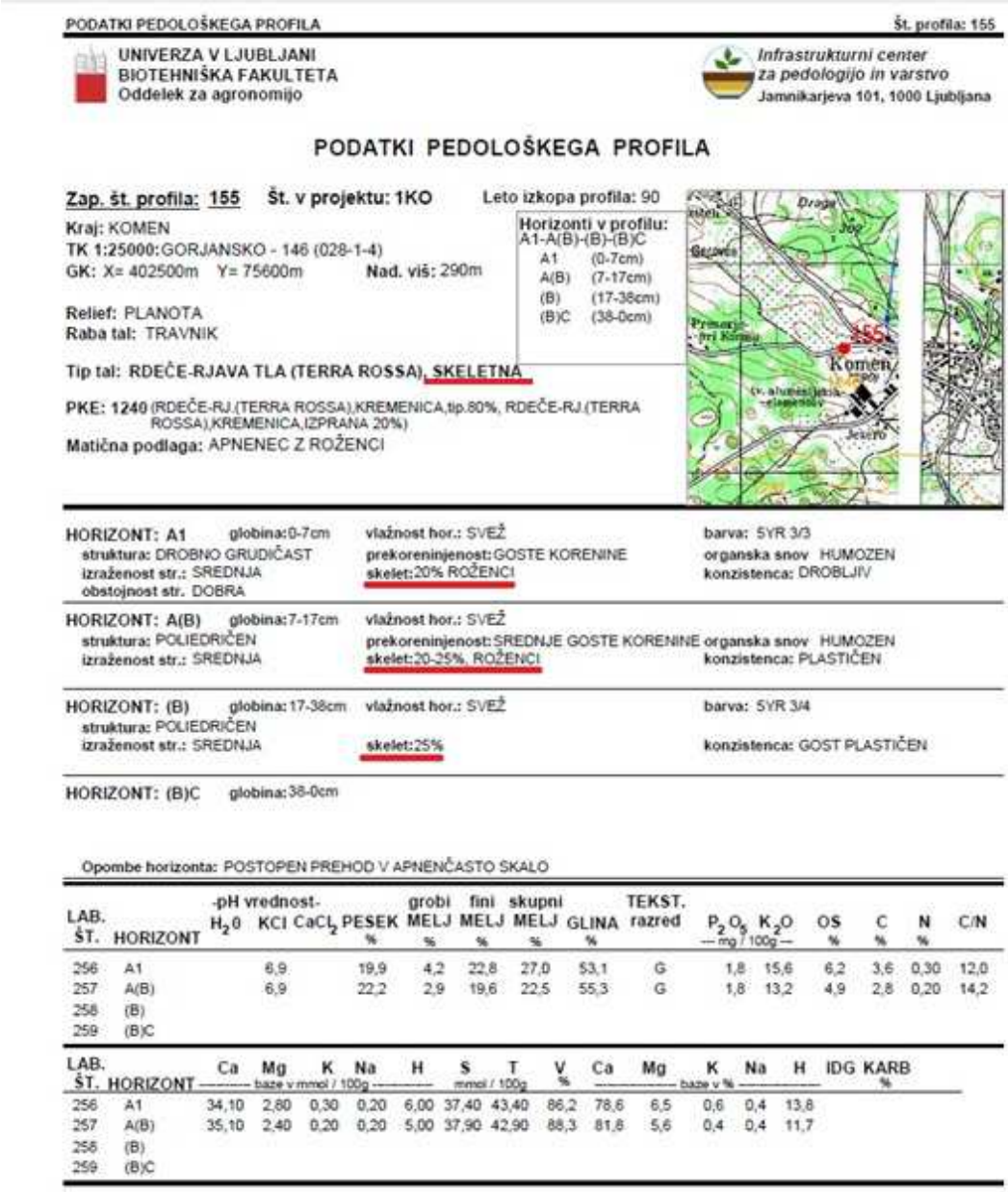
In the procedure for determining SMUs that meet the criterion 'greater presence of skeletic particles' (coarse fragments), all of the STUs represented in the area of the country that is outside of the mountain area were reviewed and given an attribute YES or NO by experts depending on the criterion; at the same time, the data indicating whether coarse fragments are present or not was also added.

In addition to taking into consideration SMUs that include the expression 'SKELETIC' in their name according to the Slovenian soil classification, representative soil profiles were also taken into account. The morphological descriptions of suitable soil profiles were used. It should be evident from a soil profile description that the proportion of coarse fragments in the top soil layer is at least 15%. Below is an example of one of the representative soil profiles with a suitable systemic designation in the STUs name and with horizon designations (Figure 5).

The term 'Skeletic' is used for presence of course material of >2mm. But there is very important how much larger is the coarse material from 2 mm and how many stones which in fact hinder the ability of soils for agricultural purposes. In Slovenian soils (also agricultural land use) prevail a coarse (skeletic) material corresponding rock fragments classes 'coarse gravel' and 'stones' according to FAO soil description criteria.

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present	Proportion of the total surface with the criterion
10	5,190	519	0
20	39,154	7,831	3
30	23,020	6,906	3
40	18,976	7,590	3
50	25,532	12,766	6
60	8,283	4,970	2
70	47,248	33,074	15
80	24,867	19,894	9
90	14,926	13,433	6
100	118,678	118,678	53
Surface area	325,874	225,661	100

Table 2: Surface of land at the SMU level, where the coarse material presence >=15% topsoil layer



PODATKI PEDOLOŠKEGA PROFILA — Št. profila: 155

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 155 Št. v projektu: 1KO Leto izkopa profila: 90

Kraj: KOMEN
TK 1:25000: GORJANSKO - 146 (028-1-4)
GK: X= 402500m Y= 75600m Nad. viš: 290m

Relief: PLANOTA
Raba tal: TRAVNIK

Horizonti v profilu: A1-A(B)-(B)-(B)C
A1 (0-7cm)
A(B) (7-17cm)
(B) (17-38cm)
(B)C (38-0cm)

Tip tal: RDEČE-RJAVA TLA (TERRA ROSSA), SKELETNA

PKE: 1240 (RDEČE-RJ.(TERRA ROSSA),KREMENICA,tip.80%, RDEČE-RJ.(TERRA ROSSA),KREMENICA,IZPRANA 20%)
Matična podlaga: APNENEC Z ROŽENCI

HORIZONT: A1 globina: 0-7cm vlažnost hor.: SVEŽ barva: 5YR 3/3
struktura: DROBNO GRUDIČAST prekoreninjenost: GOSTE KORENINE organska snov HUMOZEN
izraženost str.: SREDNJA skelet: 20% ROŽENCI konzistenca: DROBLJIV
obstojnost str. DOBRA

HORIZONT: A(B) globina: 7-17cm vlažnost hor.: SVEŽ
struktura: POLIEDRIČEN prekoreninjenost: SREDNJE GOSTE KORENINE organska snov HUMOZEN
izraženost str.: SREDNJA skelet: 20-25% ROŽENCI konzistenca: PLASTIČEN

HORIZONT: (B) globina: 17-38cm vlažnost hor.: SVEŽ barva: 5YR 3/4
struktura: POLIEDRIČEN
izraženost str.: SREDNJA skelet: 25% konzistenca: GOST PLASTIČEN

HORIZONT: (B)C globina: 38-0cm

Opombe horizonta: POSTOPEN PREHOD V APNENČASTO SKALO

LAB. ŠT.	HORIZONT	pH vrednost- H_2O	KCl	$CaCl_2$	PESEK %	grobi MELJ %	fini MELJ %	skupni MELJ %	GLINA %	TEKST. razred	P_2O_5 mg/100g	K_2O mg/100g	OS %	C %	N %	C/N
256	A1		6,9		19,9	4,2	22,8	27,0	53,1	G	1,8	15,6	6,2	3,6	0,30	12,0
257	A(B)		6,9		22,2	2,9	19,6	22,5	55,3	G	1,8	13,2	4,9	2,8	0,20	14,2
258	(B)															
259	(B)C															

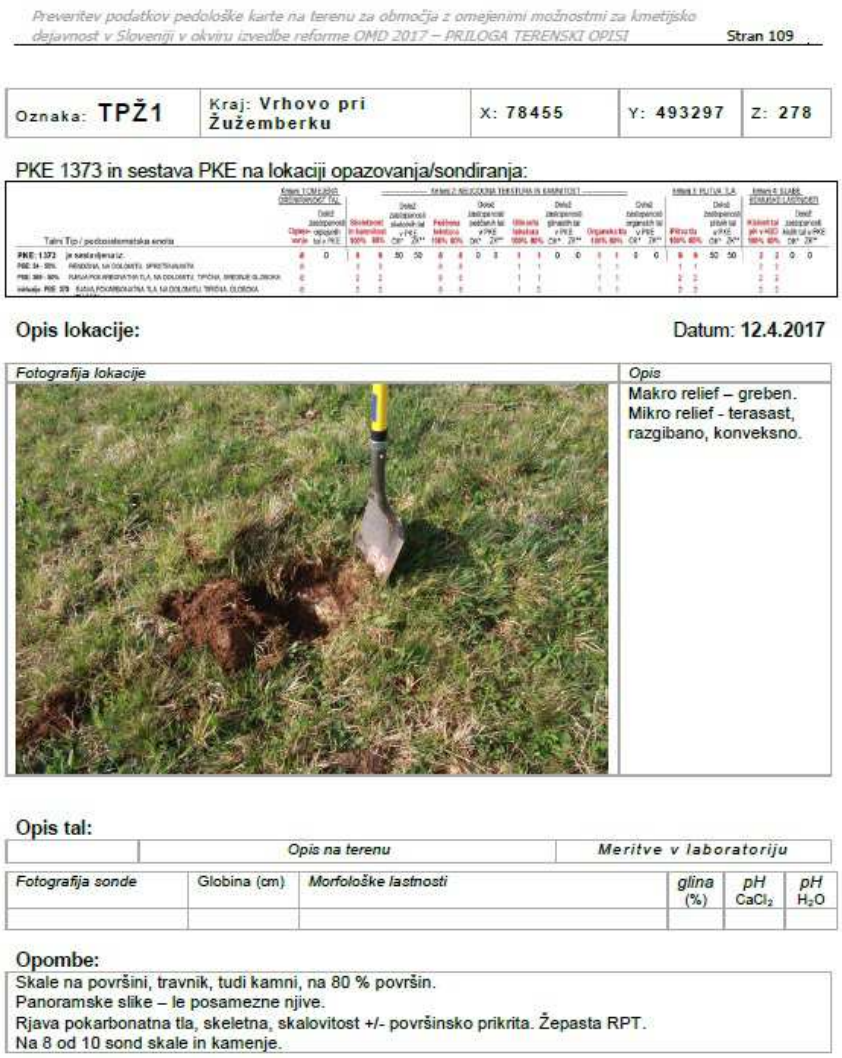
LAB. ŠT.	HORIZONT	Ca	Mg	K	Na	H	S	T	V %	Ca	Mg	K	Na	H	IDG	KARB %
		baze v mmol / 100g					mmol / 100g			baze v %						
256	A1	34,10	2,80	0,30	0,20	6,00	37,40	43,40	86,2	78,6	6,5	0,6	0,4	13,8		
257	A(B)	35,10	2,40	0,20	0,20	5,00	37,90	42,90	88,3	81,8	5,6	0,4	0,4	11,7		
258	(B)															
259	(B)C															

Figure 5: Example of the representative profile no. 155, which was selected as the representative profile for STU no. 393 present in SMU no. 1240: Terra rossa

In the areas of Suha Krajina and Bela Krajina, pedologists of the Biotechnical Faculty also carried out an inspection of the terrain using the classic field inspection method of inspecting (reconnaissance) large areas of agricultural surfaces. Test boring and excavations were selectively carried out, and the record captured by the probe usually captures an aggregate (mean) piece of data from 3–5 sub-sampling probing sites.

Below is an example of individual observations documented (Figure 6) by way of photographs, descriptions from the field, and coordinates in a Gauss-Kruger coordinate system. It served pedologists from the Biotechnical Faculty to

determine the soil typological units (STUs) and its proportion in the SMU and the assessment of whether it meets the criterion.



Preveritev podatkov pedološke karte na terenu za območja z omejenimi možnostmi za kmetijsko dejavnost v Sloveniji v okviru izvedbe reforme OMD 2017 – PRILOGA TERENSKI OPISI Stran 109

Oznaka: **TPŽ1**	Kraj: **Vrhovo pri Žužemberku**	X: 78455	Y: 493297	Z: 278

PKE 1373 in sestava PKE na lokaciji opazovanja/sondiranja:

Opis lokacije: Datum: **12.4.2017**

Fotografija lokacije	*Opis*
	Makro relief – greben. Mikro relief - terasast, razgibano, konveksno.

Opis tal:

	Opis na terenu		*Meritve v laboratoriju*		
Fotografija sonde	Globina (cm)	*Morfološke lastnosti*	*glina* (%)	*pH* $CaCl_2$	*pH* H_2O

Opombe:

Skale na površini, travnik, tudi kamni, na 80 % površin.
Panoramske slike – le posamezne njive.
Rjava pokarbonatna tla, skeletna, skalovitost +/- površinsko prikrita. Žepasta RPT.
Na 8 od 10 sond skale in kamenje.

Figure 6: Record of individual observations documented by way of photographs, descriptions from the field, and coordinates in a Gauss-Kruger coordinate system.

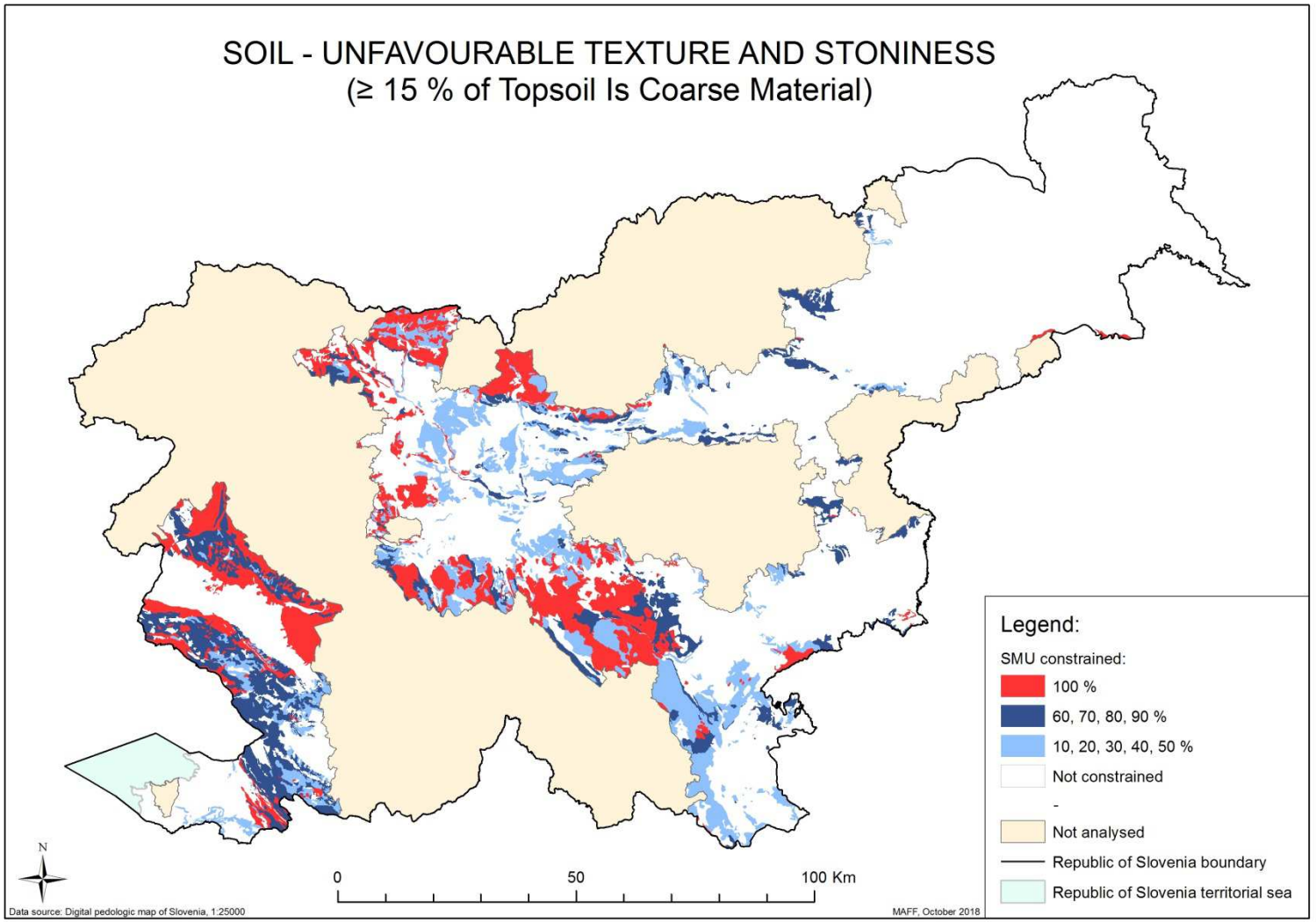


Figure 7: >=15% of the volume of the top soil layer consists of coarse material.

4.2.2. Sub-criterion: Texture class in half or more (cumulatively) of the 100 cm soil surface is sand, loamy sand defined as: silt % + (2x clay %) ≤ 30 % - sand soil texture

Due to large pores, sandy soil often has a very limited ability to retain water, and sand almost does not have any ability to retain nutrients, so the success of usual fertilising practices is limited.

Methodology

In the process of determining SMUs that meet the criterion 'sandy soil texture,' all of the STUs represented in the country's territory outside of mountain areas were reviewed; they were given the attribute YES or NO, depending on whether they meet the criterion with the help of representative profiles. The criterion stating that at least 50% of the soil profile contains the S (sand) or LP (loamy sand) texture class. The proportion of texture classes was taken into account down to the actual depth of the soil or to the depth of 100 cm of the soil whichever was deeper.

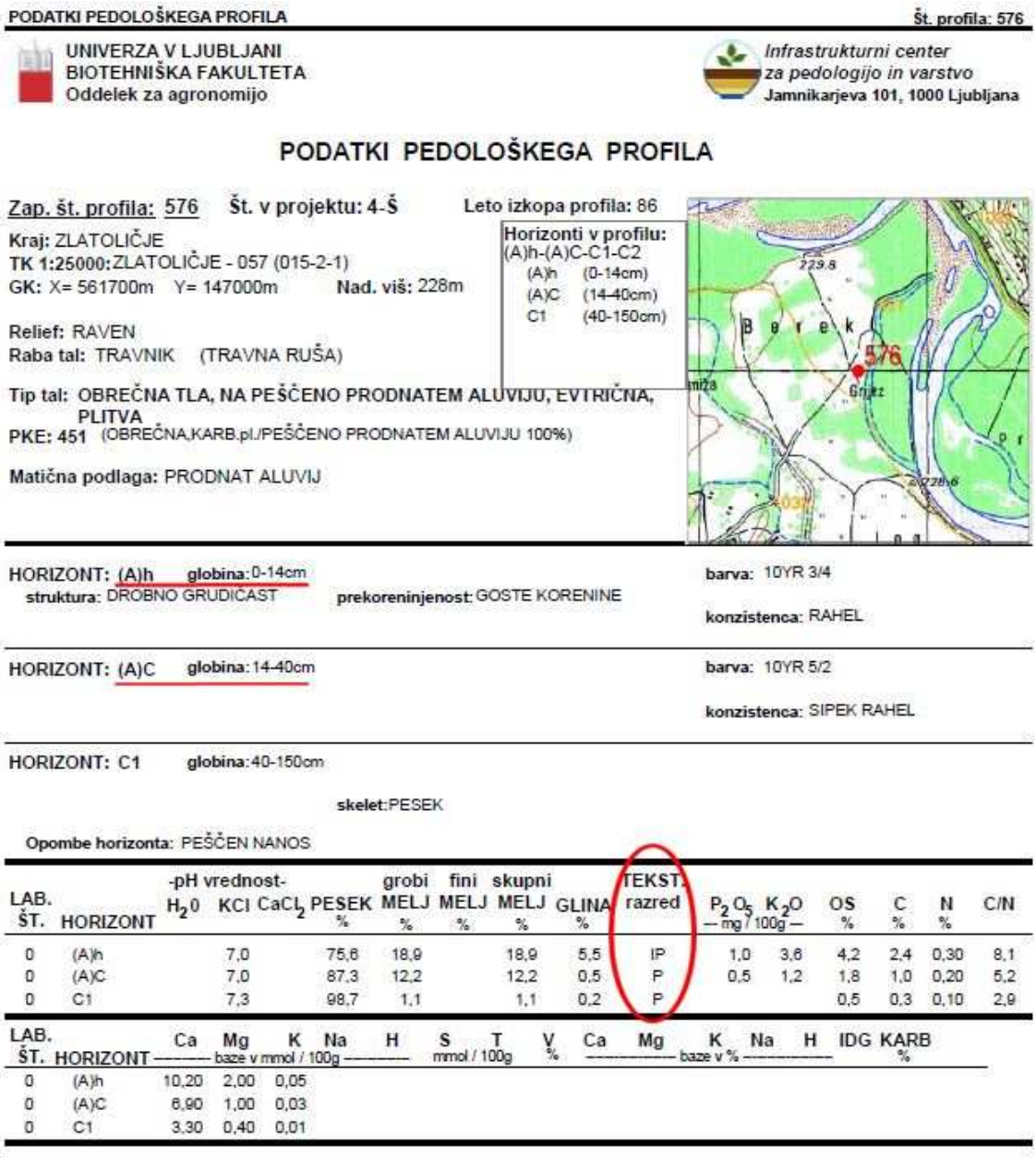
Below is an example of one of the representative soil profiles with marked texture classes LS (loamy sand) and S (sand) in soil profile (Figure 8).

Our national system uses the 2000-50-2μm for particle-size fractions (for determining the sand, fraction 2000-50μm is used), however results from international interlaboratory tests (ALVA) shows there is no important difference in soil particle-size analyses according to other soil laboratories they use FAO particle size classes. We used FAO soil texture triangle with 12 textural classes (heavy clay is not separated). During additional checking of soil database (TIS/ICPVO) we have done changes for five STU: Rendzic Leptosol and some Anthrosols in orchard and vineyard and we removed them from the delimitation.

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present	Proportion of the total surface with the criterion
10	154	15	0.1
20	7,637	1,527	11.3
30	2,777	833	6.2
40	10,517	4,207	31.2
50	336	168	1.2
60	2,841	1,705	12.7
70	3,365	2,356	17.5

80	112	90	0.7
100	2,564	2,564	19.0
Surface area	30,303	13,465	100.0

Table 3: Surface of land at the SMU level, where the criterion 'sand soil texture' is met



PODATKI PEDOLOŠKEGA PROFILA — Št. profila: 576

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 576 Št. v projektu: 4-Š Leto izkopa profila: 86

Kraj: ZLATOLIČJE
TK 1:25000: ZLATOLIČJE - 057 (015-2-1)
GK: X= 561700m Y= 147000m Nad. viš: 228m

Relief: RAVEN
Raba tal: TRAVNIK (TRAVNA RUŠA)

Tip tal: OBREČNA TLA, NA PEŠČENO PRODNATEM ALUVIJU, EVTRIČNA, PLITVA
PKE: 451 (OBREČNA,KARB.pl./PEŠČENO PRODNATEM ALUVIJU 100%)

Matična podlaga: PRODNAT ALUVIJ

Horizonti v profilu:
(A)h-(A)C-C1-C2
(A)h (0-14cm)
(A)C (14-40cm)
C1 (40-150cm)

HORIZONT: (A)h globina: 0-14cm
struktura: DROBNO GRUDIČAST
prekoreninjenost: GOSTE KORENINE
barva: 10YR 3/4
konzistenca: RAHEL

HORIZONT: (A)C globina: 14-40cm
barva: 10YR 5/2
konzistenca: SIPEK RAHEL

HORIZONT: C1 globina: 40-150cm
skelet: PESEK

Opombe horizonta: PEŠČEN NANOS

LAB. ŠT.	HORIZONT	-pH vrednost- H_2O	KCl	$CaCl_2$	PESEK %	grobi MELJ %	fini MELJ %	skupni MELJ %	GLINA %	TEKST. razred	P_2O_5 mg/100g	K_2O mg/100g	OS %	C %	N %	C/N
0	(A)h		7,0		75,6	18,9		18,9	5,5	lP	1,0	3,6	4,2	2,4	0,30	8,1
0	(A)C		7,0		87,3	12,2		12,2	0,5	P	0,5	1,2	1,8	1,0	0,20	5,2
0	C1		7,3		98,7	1,1		1,1	0,2	P			0,5	0,3	0,10	2,9

LAB. ŠT.	HORIZONT	Ca	Mg	K	Na	H	S	T	V %	Ca	Mg	K	Na	H	IDG	KARB %
		baze v mmol / 100g					mmol / 100g			baze v %						
0	(A)h	10,20	2,00	0,05												
0	(A)C	6,90	1,00	0,03												
0	C1	3,30	0,40	0,01												

Figure 8: Example of the representative profile no. 576, which was selected as the representative profile for STU no. 451 present in SMU no. 451

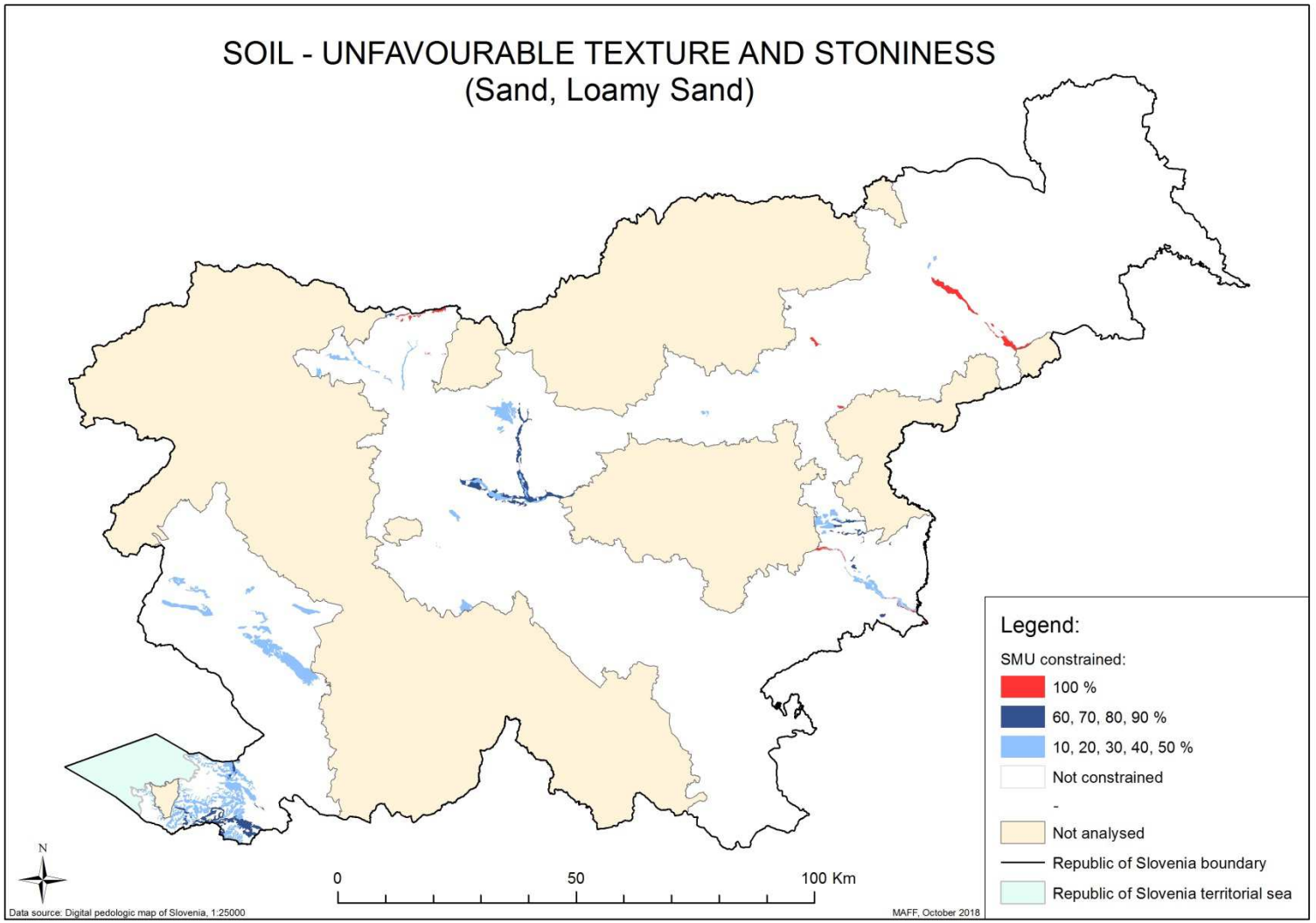


Figure 9: >=50% of the volume of the soil profile or a maximum of up to 100 cm is texture class S or LS.

4.2.3. Sub-criterion: Topsoil texture class is heavy soil – mainly clay (>= 60%) in the top soil layer

In the process of determining SMUs that meet the criterion 'topsoil texture class is heavy soil – mainly clay,' all of the STUs represented in the country's territory outside of mountain areas were reviewed; they were given attribute data depending on whether they meet the criterion with the help of representative profiles. The criterion stating that the texture class 'heavy soil – mainly clay is predominant in the top soil layer was used (clay content >=60%).
According to the data arising from the pedologic (soil) map (SM), no SMUs meeting the criterion are located in the relevant area of Slovenia.

4.2.4. Sub-criterion: Organic soil defined as organic matter (>= 30%) extends either 40 cm or more from the soil surface taken cumulatively within the upper 100 cm of the soil

The criterion 'organic soil' mainly refers to peat soil in low marshes used for agriculture (histosols).

Methodology

In the process of determining SMUs that meet the criterion 'organic soil,' all of the STUs represented in the country's territory outside of mountain areas were reviewed; they were given the attribute YES or NO, depending on whether they meet the criterion with the help of representative profiles. The criterion stating that organic soil (organic matter accounts for >=30%) with a thickness of at least 40 cm from the surface, or cumulatively up to a depth of 100 cm from the surface, was used.
Below is an example of one of the representative soil profiles with the indicated content of organic matter (Figure 10).

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present	Proportion of the total surface with the criterion
30	112	34	0.4
50	243	122	1.5
100	8,014	8,014	98.1
Surface area	8,369	8,170	100.0

Table 4: Surface of land at the SMU level, where the criterion Organic soil is met

PODATKI PEDOLOŠKEGA PROFILA — Št. profila: 2168

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 2168 Št. v projektu: 45 Leto izkopa profila: 1978

Kraj: BEVKE-NA ZRNCI
TK 1:25000: VRHNIKA - 133 (029-2-1)
GK: X= 451550m Y= 91930m Nad. viš: 289m

Relief: RAVNINA
Raba tal: TRAVNIK (MOČVIRNE RASTLINE)

Tip tal: ŠOTNA TLA NIZKEGA BARJA, GLOBOKA

PKE: 743 (ŠOTNA NIZKEGA BARJA,sr.gl.sr.HUMIFICIRANA 100%)

Matična podlaga: JEZERSKI NANOSI

Horizonti v profilu:
H(A)-H1-H2-HGy-GyC
H(A) (0-20cm)
H1 (20-50cm)
H2 (50-80cm)
HGy (80-100cm)
GyCa1 (100-120cm)
GyCa2 (120-140cm)

HORIZONT: H(A) globina: 0-20cm
ČRNICA OZIROMA NA VIDEZ RAZKROJENA ŠOTA, SLABO MINERALIZIRANA (C/N= 20,7), ČRNE BARVE, MRVIČASTI AGREGATI POVEZANI V DEBELE SKUPKE/GRUDE SE LAHKO DROBIJO IN POSTANEJO SIPKI

HORIZONT: H1 globina: 20-50cm
TEMNO RJAVA, SLABO RAZKROJENA ŠOTA, STOPNJA RAZKROJA 4-5/10 PO POSTU, DOBRO VIDNI RASTLINSKI OSTANKI

HORIZONT: H2 globina: 50-80cm
SVETLO RJAVA, ZMERNO RAZKROJENA ŠOTA, STOPNJA RAZKROJA 6/10 PO POSTU, ŠE OPAZNI RASTLINSKI OSTANKI

HORIZONT: HGy globina: 80-100cm
MOČNO RAZKROJENA ŠOTA, STOPNJA RAZKROJA 8-9/10 PO POSTU, RJAVA MEHKA, KAŠASTA

HORIZONT: GyCa1 globina: 100-120cm
APNENA GYTTJA, SIVO ZELENA, VODENA, BLATNJAVA, PRECEJŠNJA PRIMES MIVKE

HORIZONT: GyCa2 globina: 120-140cm
APNENA GYTTJA, SIVO ZELENA, VODENA, BLATNJAVA, PRECEJŠNJA PRIMES MIVKE

LAB. ŠT.	HORIZONT	pH vrednost KCl	pH vrednost $CaCl_2$	OS %	C %	N %	C/N	Specifična teža navidezna g/cm³	Specifična teža prava g/cm³	Volumski delež voda %	Volumski delež zrak %	Volumski delež suha snov %	Poroznost %	Stopnja razkroja	Karbonati %
	H(A)	6,5		37,0	21,5	1,04	20,7	3,51	1,98	55,6	22,0	22,4	77,6		0,9
	H1	6,1		61,3	35,6	1,93	18,4	2,57	1,89	82,3	4,2	13,5	86,5	4-5	1,3
	H2	6,0		62,8	36,4	1,57	23,2	3,60	1,77	71,0	8,7	20,3	79,7	5	1,1
	HGy	6,5		65,8	38,2	1,74	22,0	1,72	1,72	86,8	3,2	10,0	90,0	8	0,9
	GyCa1	8,3		11,3	6,6	0,62	10,6	5,26	2,49	77,4	1,5	21,1	78,9		26,5
	GyCa2	8,3		9,3	5,4	0,55	9,8	6,01	2,59	73,9	2,9	23,2	76,8		31,3

Figure 10: Example of the representative profile no. 2168, which was selected as the representative profile for STU no. 743 present in SMU no. 743.

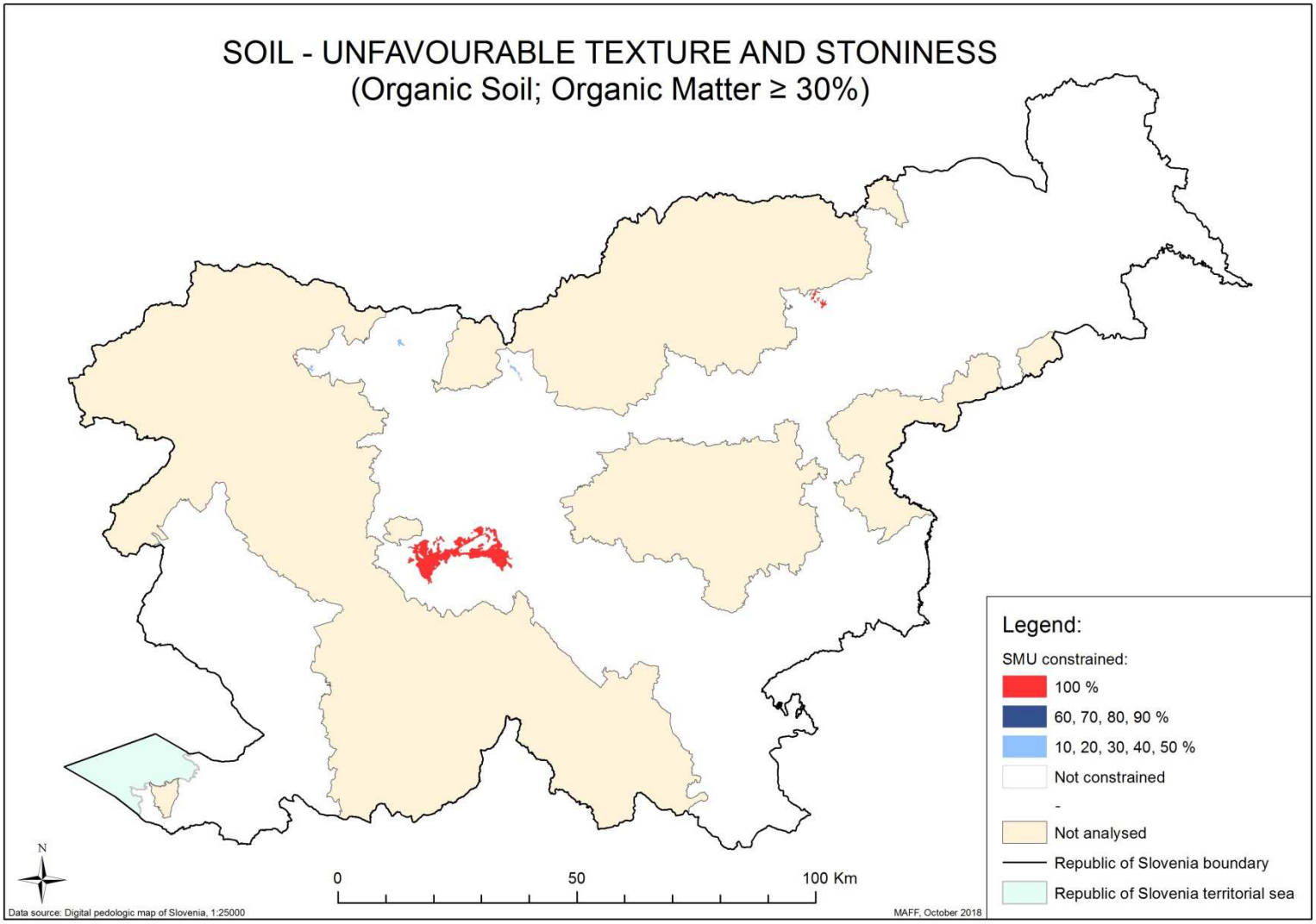


Figure 11: Organic soil (>=30% – content of organic substances).

4.3. Criterion: Shallow rooting depth

The criterion ‘shallow rooting depth' shows areas where the soil depth from the surface to the bedrock is smaller than or equal to 30 cm. Such shallow rooting depth causes a number of constraints for agriculture, such as the inability to plough or the risk for devices to be damaged while ploughing; the available water capacity is also very reduced, which can quickly lead to a lack of water. For this reason, soil with rooting depth <= 30 cm is a very large constraint for the cultivation of crops.

Methodology

In the process of determining SMUs that meet the criterion ‘ shallow rooting depth,’ all of the STUs represented in the country’s territory outside of mountain areas were reviewed; they were given the attribute YES or NO, depending on whether or not they meet the criterion. Attribute data was determined for soil typological units (STUs) depending on whether or not they meet the criterion, with the help of representative profiles or test boring (probing) data. The criterion stating that the depth from the surface of the soil to the bedrock or solid soil does not exceed 30 cm was used.

Shallow rooting depth was determined according to description in the field. The abundance of roots is recorded for each soil horizon according to root density; and often general rooting depth is assessed as rooting depth class as well.

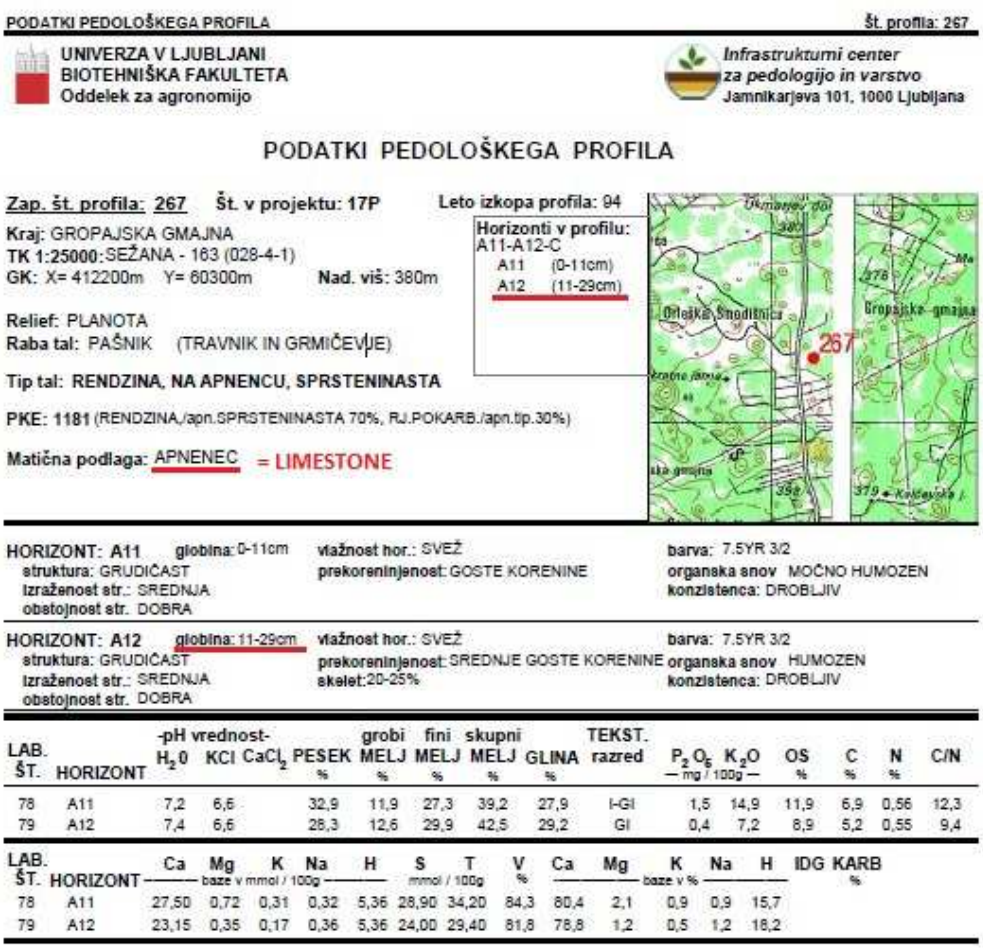
Shallow soils were assessed mostly on ‘hard rock’, mostly on limestone and dolomite. However, we have also shallow soils on alluvial plains, where sediments with various size of material from coarse gravel and gravel, or sand, or silt or clay, are present. Gravel alluvial plains prevail in Slovenia; shallow soils on alluvium of river Drava are very shallow (less than 30 cm), where also roots are usually not deeper than 30 cm, however, there is not hard rock.

SI was completely followed by the JRC remark from December 2018, and therefore, only Soils on Hard Rock are taken into account. The shallow soils on alluvium were completely removed from the delimitation.

Below is an example of one of the representative soil profiles with marked texture classes (Figure 12).

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present (ha)	Proportion of the total surface with the criterion
10	1,559	156	0.1
20	87,945	17,589	13.7
30	39,995	11,998	9.4
40	34,892	13,957	10.9
50	57,884	28,942	22.6
60	5,355	3,213	2.5
70	20,015	14,010	10.9
80	7,301	5,841	4.6
90	12,057	10,851	8.5
100	21,489	21,489	16.8
Surface area	288,492	128,046	100.0

Table 5: Surface of land at the SMU level, where the criterion 'shallow rooting depth' is met



PODATKI PEDOLOŠKEGA PROFILA — Št. profila: 267

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 267 Št. v projektu: 17P Leto izkopa profila: 94

Kraj: GROPAJSKA GMAJNA
TK 1:25000: SEŽANA - 163 (028-4-1)
GK: X= 412200m Y= 60300m Nad. viš: 380m

Horizonti v profilu: A11-A12-C
A11 (0-11cm)
A12 (11-29cm)

Relief: PLANOTA
Raba tal: PAŠNIK (TRAVNIK IN GRMIČEVJE)

Tip tal: RENDZINA, NA APNENCU, SPRSTENINASTA

PKE: 1181 (RENDZINA/apn.SPRSTENINASTA 70%, RJ.POKARB./apn.tip.30%)

Matična podlaga: APNENEC = LIMESTONE

HORIZONT: A11 globina: 0-11cm
struktura: GRUDIČAST
izraženost str.: SREDNJA
obstojnost str. DOBRA
vlažnost hor.: SVEŽ
prekoreninjenost: GOSTE KORENINE
barva: 7.5YR 3/2
organska snov MOČNO HUMOZEN
konzistenca: DROBLJIV

HORIZONT: A12 globina: 11-29cm
struktura: GRUDIČAST
izraženost str.: SREDNJA
obstojnost str. DOBRA
vlažnost hor.: SVEŽ
prekoreninjenost: SREDNJE GOSTE KORENINE
skelet: 20-25%
barva: 7.5YR 3/2
organska snov HUMOZEN
konzistenca: DROBLJIV

LAB. ŠT.	HORIZONT	-pH vrednost- H_2O	KCl	$CaCl_2$	PESEK %	grobi MELJ %	fini MELJ %	skupni MELJ %	GLINA %	TEKST. razred	P_2O_5 mg/100g	K_2O mg/100g	OS %	C %	N %	C/N
78	A11	7,2	6,6		32,9	11,9	27,3	39,2	27,9	I-Gl	1,5	14,9	11,9	6,9	0,56	12,3
79	A12	7,4	6,6		28,3	12,6	29,9	42,5	29,2	Gl	0,4	7,2	8,9	5,2	0,55	9,4

LAB. ŠT.	HORIZONT	Ca	Mg	K	Na	H	S	T	V %	Ca	Mg	K	Na	H	IDG	KARB %
		baze v mmol / 100g					mmol / 100g			baze v %						
78	A11	27,50	0,72	0,31	0,32	5,36	28,90	34,20	84,3	80,4	2,1	0,9	0,9	15,7		
79	A12	23,15	0,35	0,17	0,36	5,36	24,00	29,40	81,8	78,8	1,2	0,5	1,2	18,2		

Figure 12: Example of the representative profile no. 267 on limestone, which was selected as the representative profile for STU no. 30 present in SMU no. 1181

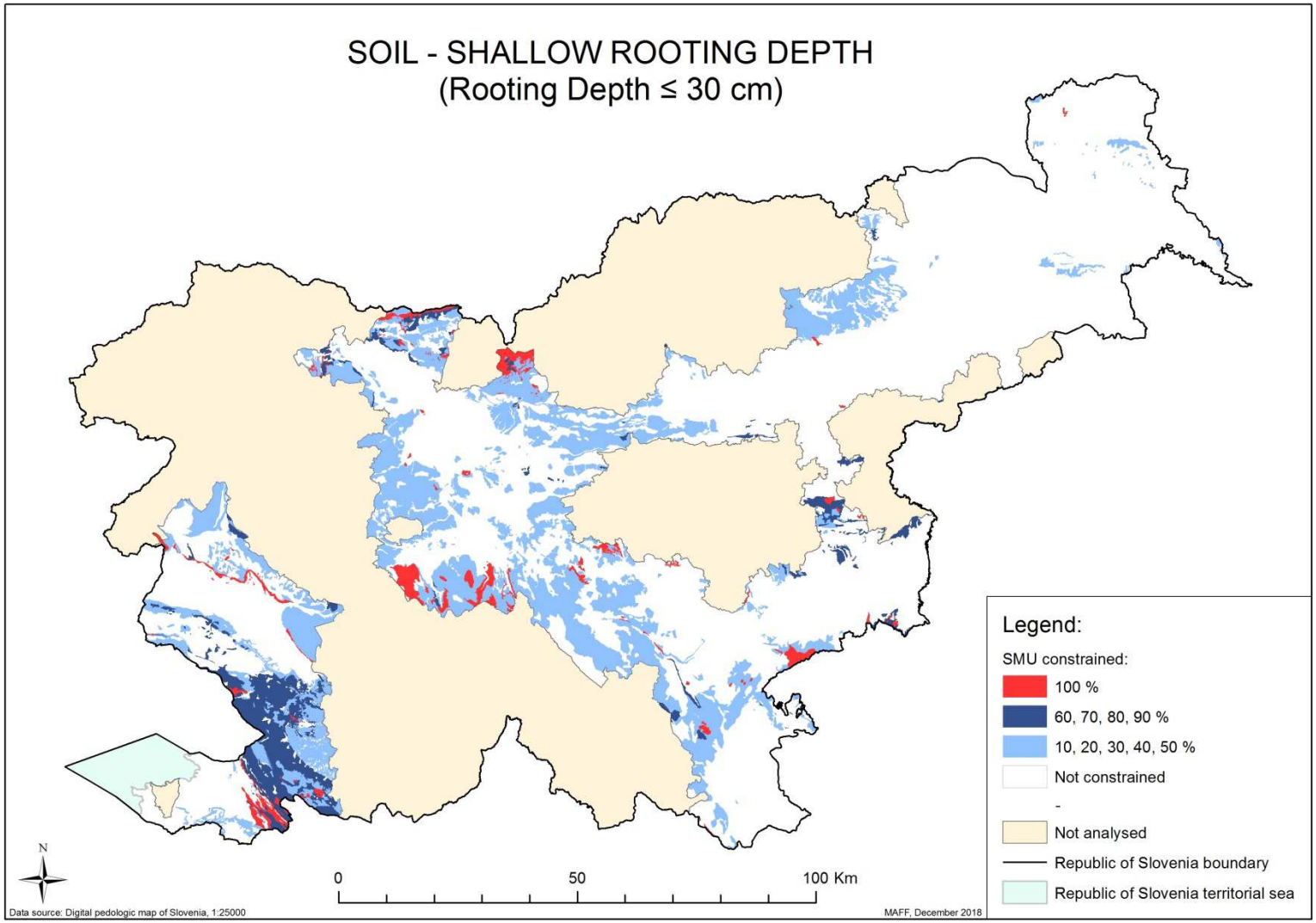


Figure 13: Shallow rooting depth (<=30 cm from the surface of the soil).

4.4. Criterion: Poor chemical properties

The criterion 'poor chemical properties' is evident due to three different properties:

- soil salinity;
- soil sodium content;
- soil acidity.

For Slovenia, soil acidity is relevant.

Some soil can be acidic or basic due to the structure of the bedrock from which it was formed. A low pH value in soil limits the availability of most nutrients. Most crops are the most productive at pH values ranging from 6.0 to 7.2.

Methodology

In the process of determining SMUs that meet the criterion 'soil acidity,' all of the SMUs represented in the country's territory outside of mountain areas were reviewed; they were given the attribute YES or NO, depending on whether or not they meet the criterion.
Attribute data was determined for soil units (STUs) depending on whether or not they meet the criterion, with the help of representative profiles. The criterion stating that the pH value in the top soil layer was measured in H20<=5 was used. However, because in Slovenia the pH value in soil samples is almost always measured in a chloride (KCl or $CaCl_2$) and less frequently in water, the conversion function described below was prepared.
Older analytical procedure has used 1M solution of KCl, which was replaced with the new procedure using 0,01M CaCl2 since 1997. Several verification/validations have been preceded. Generally the measured difference between those two extractions is lower than seasonal oscillation of pH, so we accepted the measurement of pH in KCl and in CaCl2 give the same result. Mainly results of pH in KCl were used for elaboration of PTF between pH in H2O and pH in chloride.

Proportion of SMU meeting the criterion	Total SMU surface where the criterion is present (ha)	Surface where the criterion is present	Proportion of the total surface with the criterion
10	266	27	0
20	23,816	4,763	8
30	2,560	6,468	10
40	24,689	9,876	16

50	10,474	5,237	8
60	2,934	1,760	3
70	8,824	6,177	10
80	3,309	2,647	4
90	465	418	1
100	24,475	24,475	40
Surface area	120,812	61,848	100

Table 6: Surface of land at the SMU level, where the criterion Acidic soil (pH value of water <=5) is met.

Description of the soil conversion function

There are 354 pieces of analytical data on soil in the TIS/ICPVO database containing the measured pH values, both in an extracted sample with water and in a chloride. In order to be able to use data from most of the soil profiles in the database, which only have a measured pH value in a chloride, a soil conversion function was calculated (hereinafter: SCF). Multiple calculations were carried out and, after verifying them, it was found that the dataset must be divided in half ($pH_{chloride}$ < 5.5 and $pH_{chloride}$ ≥ 5.5). The calculated SCFs are carried out on the basis of linear regression, which does not take into account other soil properties (Table 7). In order to determine the criterion 'soil acidity,' only the conversion function for soil with pH values < 5.5 was used.

$pH_{chloride}$ < 5.5 n=134, r^2=0.922	$pH_{chloride}$ ≥ 5.5 n=220, r^2=0.842
pH_{water} = 1.10829 + 0.980321 x $pH_{chloride}$ $pH_{chloride}$ = -0.291023 + 0.867204 x pH_{water}	pH_{water} = 1.95 + 0.824471 x $pH_{chloride}$ $pH_{chloride}$ = 0.282283 + 0.858858 x pH_{water}

Table 7: Soil conversion functions (SCF/ICPVO) for converting pH values depending on extraction type (H2O, KCl, or $CaCl_2$)

Below is an example of one of the representative soil profiles with marked pH values in $CaCl_2$, which must be <= 4.1 according to the soil conversion function.

PODATKI PEDOLOŠKEGA PROFILA Št. profila: 1106

UNIVERZA V LJUBLJANI
BIOTEHNIŠKA FAKULTETA
Oddelek za agronomijo

Infrastrukturni center za pedologijo in varstvo
Jamnikarjeva 101, 1000 Ljubljana

PODATKI PEDOLOŠKEGA PROFILA

Zap. št. profila: 1106 Št. v projektu: 11 TP Leto izkopa profila: 96

Kraj: TRIBUČE-BELAVA
TK 1:25000: ČRNOMELJ - 190 (031-3-4)
GK: X= 519300m Y= 43200m Nad. viš: 200m
Naklon: 3% Ekspozicija: SEVERO-VZHOD
Relief: BLAGO POBOČJE
Raba tal: TRAVNIK (ZARAŠČAJOČ TRAVNIK (CALLUNA))
Tip tal: IZPRANA TLA, NA PLIOCENSKIH SEDIMENTIH, IZPRANA, AKRIČNA

Horizonti v profilu: Ah-E-Bt1-Bt2

Ah	(0-18cm)
E	(18-39cm)
Bt1	(39-70cm)
Bt2	(70-120cm)

PKE: 1581 (IZPRANA (LUVISOL),/PLIOC.SEDIMENTIH,tip.60%, IZPRANA (LUVISOL),/apn.+dol.AKRIČNA 40%)
Matična podlaga: APNENEC

Opombe profila: VRTANO 120-140CM, G, IZREDNO ZBITO, ŠE PREVLEKE

HORIZONT OI: 2-0CM: LISTJE HRASTA, BREZE, GABRA, OSTANKI RESE

HORIZONT: Ah globina: 0-18cm vlažnost hor.: SVEŽ barva: 7.5YR 4/4
struktura: OREŠKAST prekoreninjenost: SREDNJE GOSTE KORENINE organska snov SREDNJE HUMOZEN
izraženost str.: SREDNJA konzistenca: MEHEK RAHEL DROBLJIV
obstojnost str. SLABO
Opombe horizonta: ZGORNJI DEL PROFILA VERJETNO EROZIJSKO ODNEŠEN

HORIZONT: E globina: 18-39cm vlažnost hor.: SUH DO SVEŽ barva: 5YR 5/6
struktura: DROBNO POLIEDRIČEN prekoreninjenost: POSAMEZNE KORENINE organska snov MINERALEN
izraženost str.: SREDNJA konzistenca: S GOST RAHEL ZBIT DROBL.
obstojnost str. SLABO novotvorbe: DROBNE KONKRECIJE

HORIZONT: Bt1 globina: 39-70cm vlažnost hor.: SVEŽ barva: 2.5YR 3/6
struktura: POLIEDRIČEN prekoreninjenost: NEPREKORENINJEN organska snov MINERALEN
izraženost str.: SREDNJA konzistenca: GOST ZBIT
obstojnost str. DOBRA novotvorbe: MOČNE PREVLEKE FE IN MN KONKRECIJE
Opombe horizonta: JEZIKAVOST E V BT1

HORIZONT: Bt2 globina: 70-120cm vlažnost hor.: SVEŽ barva: 2.5YR 3/6
struktura: POLIEDRIČEN prekoreninjenost: NEPREKORENINJEN organska snov MINERALEN
izraženost str.: SREDNJA konzistenca: ZELO ZBIT
obstojnost str. DOBRA novotvorbe: MOČNE PREVLEKE FE IN MN KONKRECIJE
Opombe horizonta: ŠE REDKE LISE E HORIZ.

LAB. ŠT.	HORIZONT	-pH vrednost- H_2O	KCl	$CaCl_2$	PESEK %	grobi MELJ %	fini MELJ %	skupni MELJ %	GLINA %	TEKST. razred	P_2O_5	K_2O	OS %	C %	N %	C/N
											--- mg / 100g ---					
1110	Ah		4,0		20,4	18,0	44,1	62,1	17,5	MI		-1,0	3,0	1,7	0,17	10,2
1111	E		4,0		14,2	23,6	39,5	63,1	22,7	MI		-1,0	0,7	0,4	0,06	6,8
1112	Bt1		4,0		17,4	21,1	30,3	51,4	31,2	MGI		-1,0				
1113	Bt2		3,9		14,8	21,1	28,3	49,4	35,8	MGI						

LAB. ŠT.	HORIZONT	Ca	Mg	K	Na	H	S	T	V %	Ca	Mg	K	Na	H	IDG	KARB %
		---------- baze v mmol / 100g ----------					mmol / 100g			---------- baze v % ----------						
1110	Ah	0,22	0,06	0,07	0,01	12,95	0,30	13,30	2,7	1,7	0,4	0,5		97,3		
1111	E	0,30	0,07	0,04	0,01	9,10	0,40	9,50	4,4	3,2	0,7	0,4	0,1	95,6		
1112	Bt1	1,27	0,31	0,06	0,02	9,85	1,70	11,50	14,4	11,0	2,7	0,5	0,1	85,6		
1113	Bt2	1,50	0,52	0,08	0,02	11,05	2,10	13,20	16,1	11,4	3,9	0,6	0,1	83,9		

Figure 14: Example of the representative profile no. 1106, which was selected as the representative profile for STU no. 411 present in SMU no. 1581

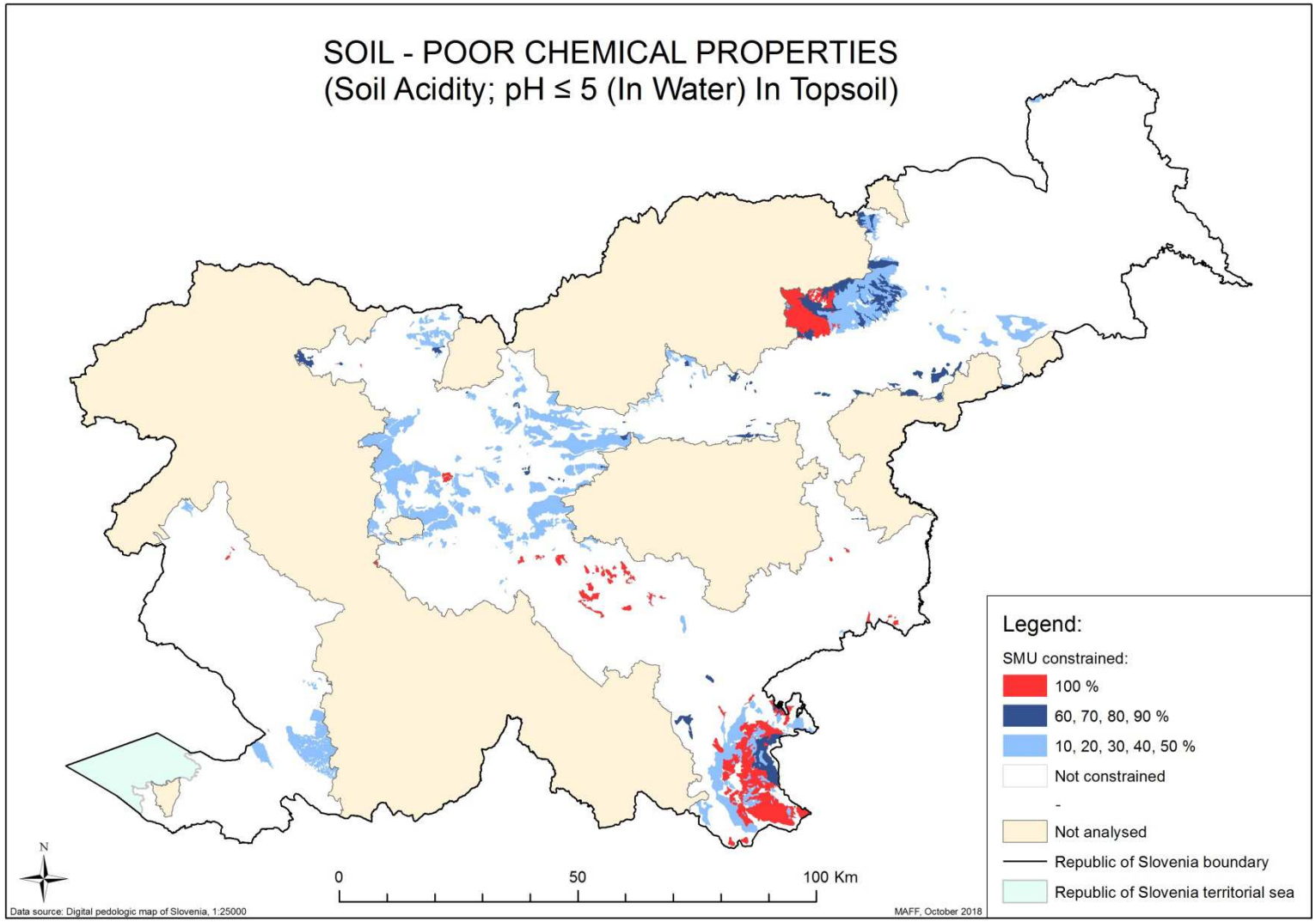


Figure 15: Acidic soil (pH in water <=5).

4.5. Criterion: Slope

In order to determine the slope criterion, a digital relief model (which also contains the digital elevation model) with raster cell size of 12.5x12.5 m was used. The estimated elevation accuracy of the model is 3.2 m, but it depends on the characteristics of the area: on flat surfaces, this accuracy is 1.1 m, on gentle hills 2.3 m, in hills 3.8 m, and in mountains 7.0 m. The planimetric accuracy of the model is 2 metres. The custodian of the database used is the Mapping and Surveying Authority of the Republic of Slovenia (http://www.e-prostor.gov.si/zbirke-prostorskih-podatkov/topografski-in-kartografski-podatki/digitalni-model-visin/digitalni-model-visin-z-locljivostjo-dmv-125-dmv-25-dmv-100/)

A tool from the ArcGIS geographic information system was used for calculating slope. The tool ‘slope’ (ArcToolbox/3D Analyst Tools/Raster Surface/Slope), using a bilinear method (Bicubic Spline Interpolation) was applied. Bilinear interpolation is a method which takes into account the values of the eight closest cell centres when determining the value of each cell of the starting raster layer. The obtained new value is a weighted average of the value in all eight cells. The weight is the distance from the projected centre of the initial cell. The method is suitable for re-sampling continuous raster layers, such as relief and slope.

The slope was calculated in %. Cells where the slope is greater than or equal to 15%, were identified as constrained.

Figure 16 shows those areas/surfaces in the area of other ANCs, special ANCs, and areas not classified as ANCs that meet slope criterion ≥15%. The total surface of these areas is 524,718 ha.

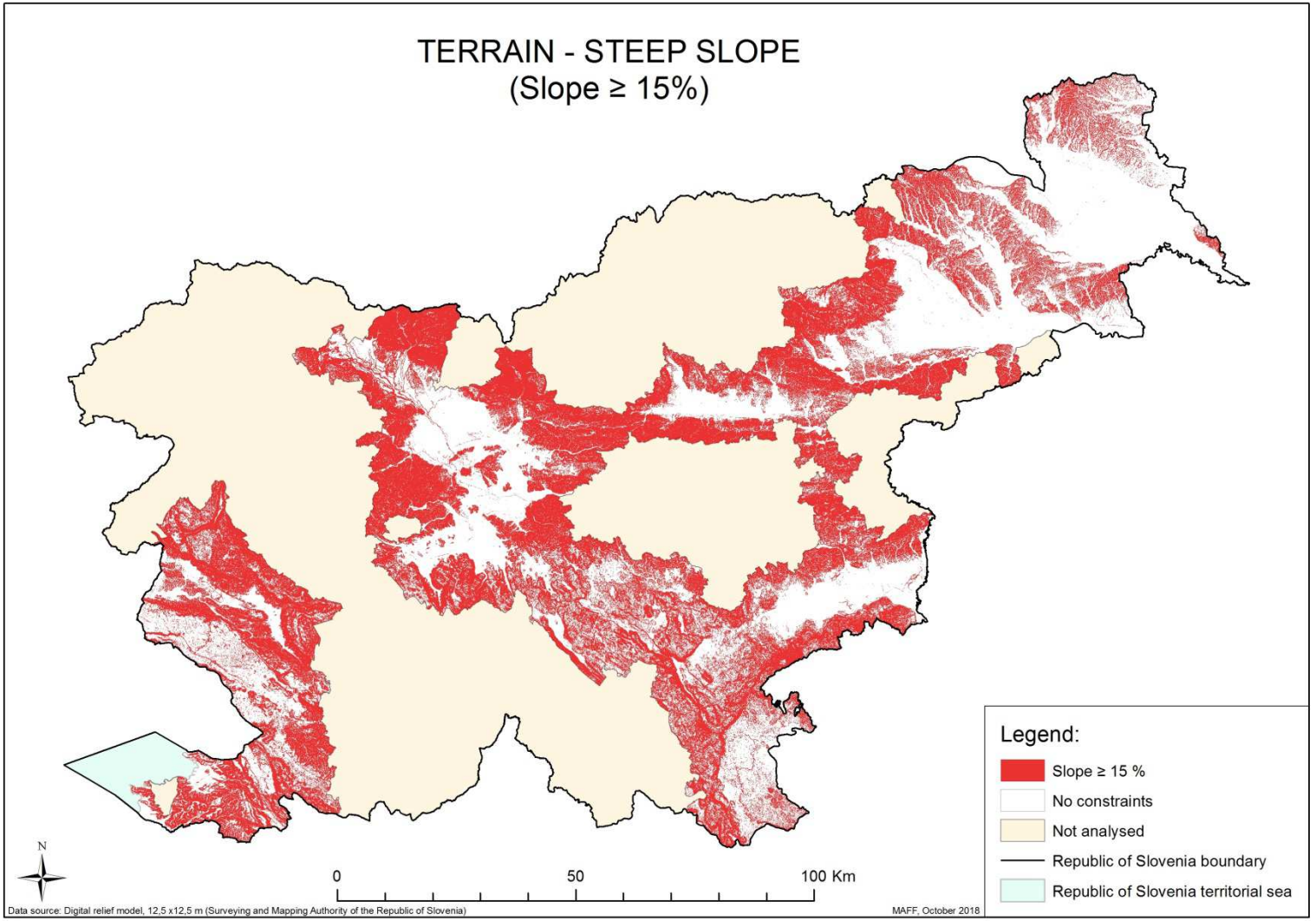


Figure 16: Slope >=15).

4.6. Comparison of all criterion maps with maximum operator

This chapter encompasses the overall map of area with constraints. Soil constraints could be presented by shares solely (Figure 17). However, slope could be spatially indicated. Figure 18 shows the soil constraints and slope together. The different presentations resulted from two various data bases, namely the soil map and the DEM.

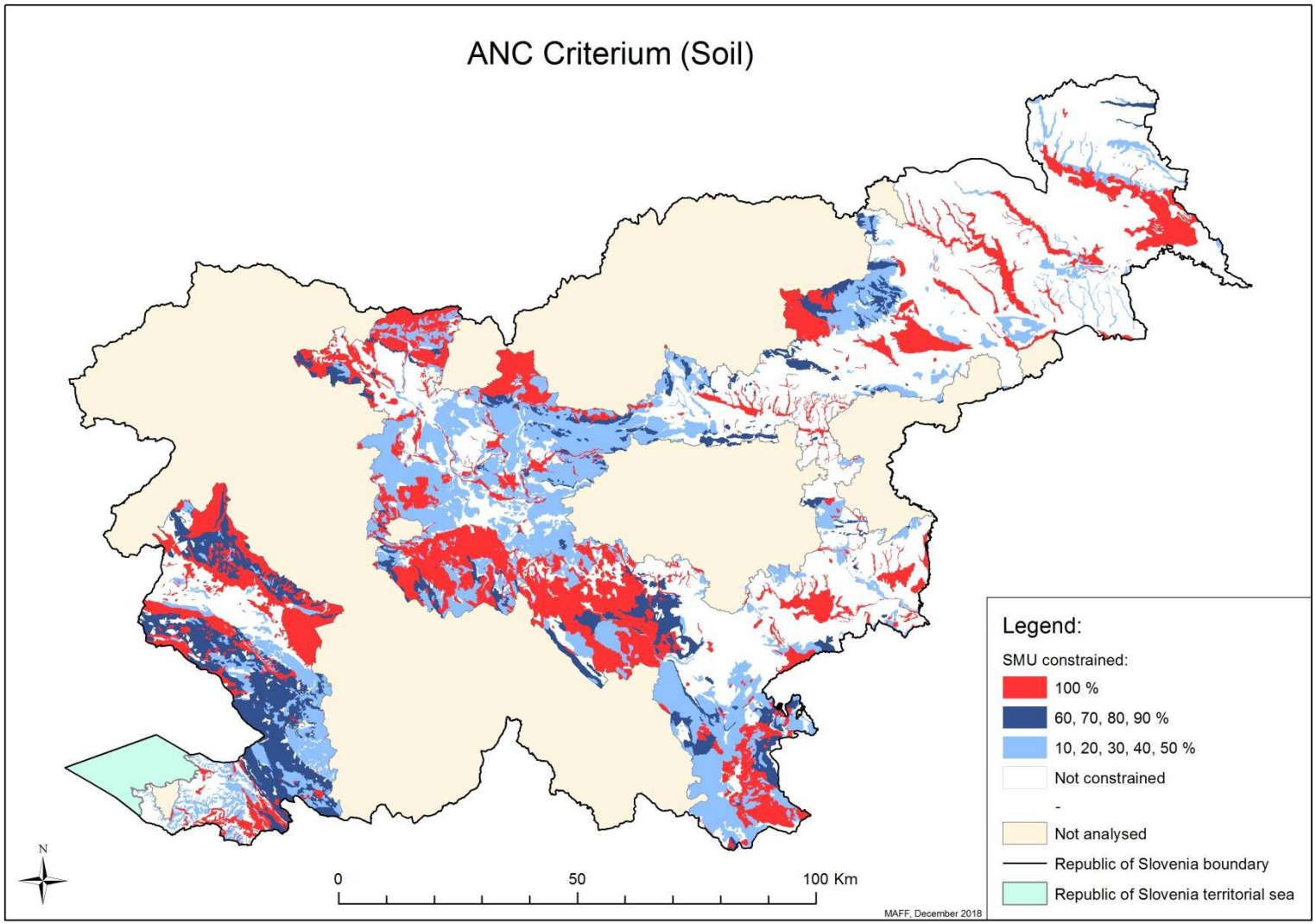


Figure 17: Map of constraints from soil map with maximum operator

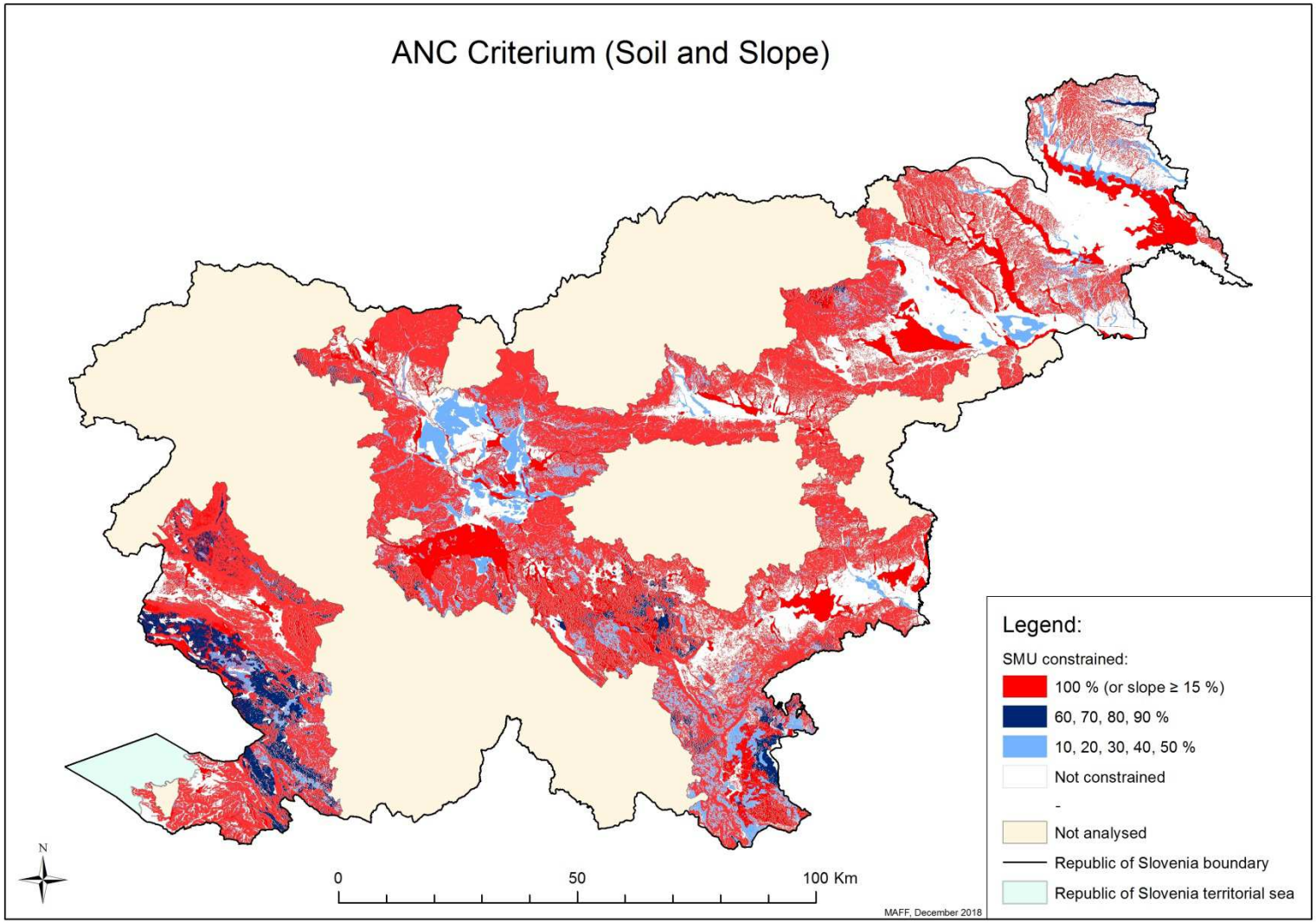


Figure 18: Map of constraints from soil map and slope with maximum operator

5. Correction with data on agricultural land

In accordance with the procedure for determining ANCs, the areas that are not used for agricultural purposes must be excluded from the analysis in order to avoid the incorrect spatial assessment of the areas intended for agriculture. For this reason, only the biophysical constraints in agricultural areas are discussed below.

5.1 Record of agricultural land

For the purpose of determining areas with biophysical constraints in agricultural areas, the database 'land use map with a scale of 1: 5,000' was used (record of the actual use of agricultural and forest land = land use map).

According to the Agriculture Act, the Agriculture Land Use database is:

- the single national record on the actual land use of agricultural and forest land,
- it is managed in the Geographic Information System,
- polygons of actual land use are entered into the national coordinate system.

The Agriculture Land Use database in Slovenia is updated every three years (1/3 of country is updated yearly) using CAPI (computer aided photo interpretation) method. Aerial photographs with a 0.5x0.5 m resolution are used for interpretation. It is managed and maintained at the Ministry of Agriculture, Forestry and Food and it is used as the control layer for plotting agricultural land plots for the implementation of Common Agricultural Policy measures. It is also used in the national land cadastre as the basis for calculating cadastral income. The record is accessible at http://rkg.gov.si/GERK/.

According to the record of actual use of agricultural land, there are 604,153 ha of land used for agriculture in Slovenia. The following uses listed in the record are defined as agricultural land:

Code of use	Category of use
1100	Arable land
1160	Hop fields
1180	Other permanent plants on arable land
1190	Green houses
1211	Vineyards
1212	Nursery
1221	Intensive orchard
1222	Extensive orchards

1230	Olive groves
1240	Other permanent crops
1300	Meadows and pastures
1321	Swampy meadows
1800	Forest trees on agricultural land

Table 8: The categories of use of the Actual Agricultural Land Use Record included in the definition of agricultural land in Slovenia.

The Agricultural Land Use database from June 2018 (June 30, 2018) was used in the analysis. Land use categories listed in Table 8, were used to determine areas with biophysical constraints on agricultural land.

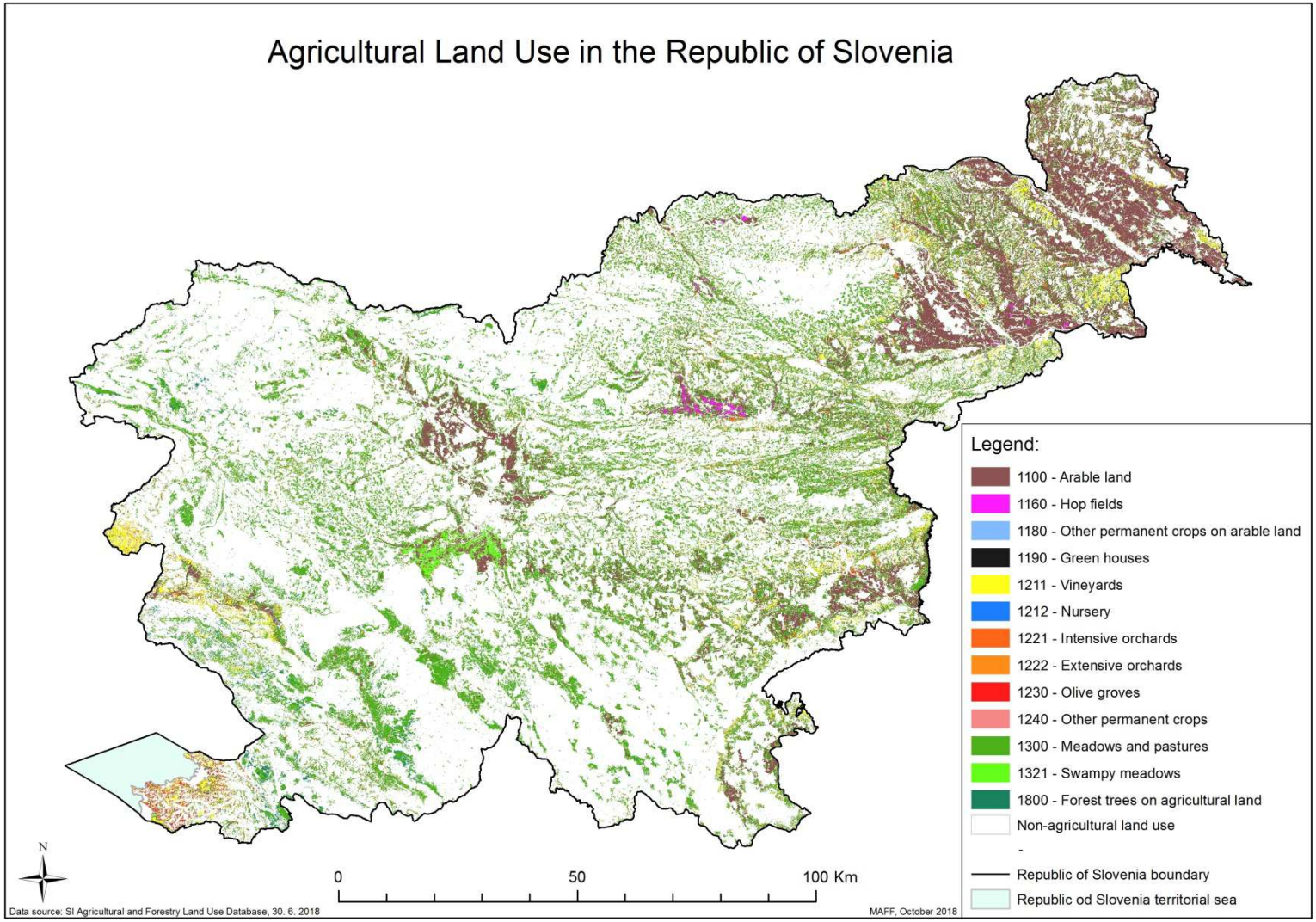


Figure 19: Types of actual agricultural land use

6. Biophysical constraints on agricultural land according to individual criteria

The same approach and the same key symbols were used in the procedure for the graphic depiction of biophysical constraints on agricultural land as for the basic evaluation of criteria (in chapter 4). A graphic symbol and a tabular depiction of the surface of agricultural land on which a biophysical constraint or an individual criterion is present are made for each criterion.

Methodology (spatial analysis) for identifying agricultural land with natural constraints

In the procedure for determining biophysical constraints on agricultural land, the SMU layer (soil map) and the agricultural land use layer were intersected. The number of hectares, affected by a particular criterion (biophysical constraint), was calculated by taking into account the proportion of constraint in SMU.

Each criterion is presented individually with no interaction with other criterion, which could be determined by the same soil type in SMU.

6.1. Limited soil drainage – on agricultural land

Most of the agricultural land with the constraint 'limited soil drainage' is located in the SMU where this constraint accounts for 100% of the area. The areas with this constraint are most frequently found along rivers and streams, in central Slovenia and in the area of the Ljubljana Moors.

Proportion of the constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land with constraints (ha)	Proportion in the total agricultural land with constraints (%)
20	624	125	0.2
30	3,150	945	1.8
40	594	238	0.5
50	1,937	968	1.9
60	2,070	1,242	2.4
70	24	17	0.0
80	753	602	1.2
100	47,849	47,849	92.0
Total agricultural land facing constraints	57,001	51,986	100.0

Table 9: Gleyic colour pattern within 40 cm from the surface on agricultural land

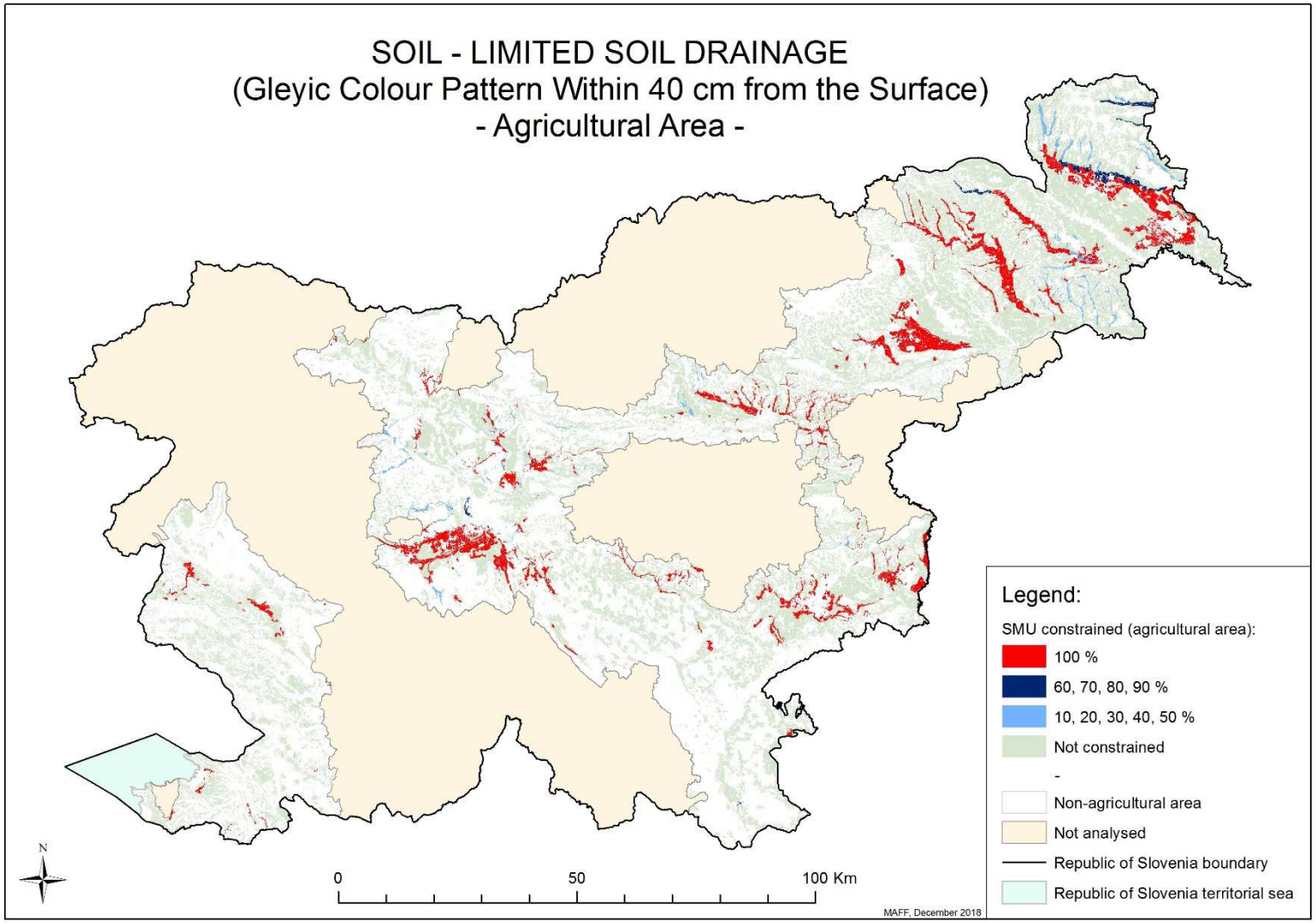


Figure 20: Gleyic soil on agricultural land (prior to the fine-tuning exercise)

6.2. At least 15% of the top layer volume is coarse fragments, including any proporation of rock outcrops or boulders – on agricultural surfaces.

Most of the agricultural land with the sub-criterion '>= 15% of the top layer volume is coarse material, including isolated rocks and boulders' is located in the SMU where this constraint accounts for 100% of the area. Coarse material, rocks, and boulders are typical for karst surfaces, which is present in over 40% of Slovenia's surface area. A part of the karst surface is already included in the mountain area and is not subject to this analysis. In the analysed area, the criterion is most evident in Slovenia's typical karst areas, such as the Karst, Suha Krajina, and Bela Krajina.

Proportion of constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land facing constraints (ha)	Proportion in the total agricultural land with constraints (%)
10	515	52	0.1
20	16,285	3,257	9.0
30	5,442	1,633	4.5
40	3,645	1,458	4.0
50	4,111	2,056	5.7
60	1,018	611	1.7
70	7,972	5,580	15.3
80	4,650	3,720	10.2
90	3,428	3,085	8.5
100	14,933	14,933	41.0
Total agricultural land facing constraints	61,999	36,385	100.0

Table 10: Soil with coarse fragments on agricultural land according to the proportion of the constraint in the SMU

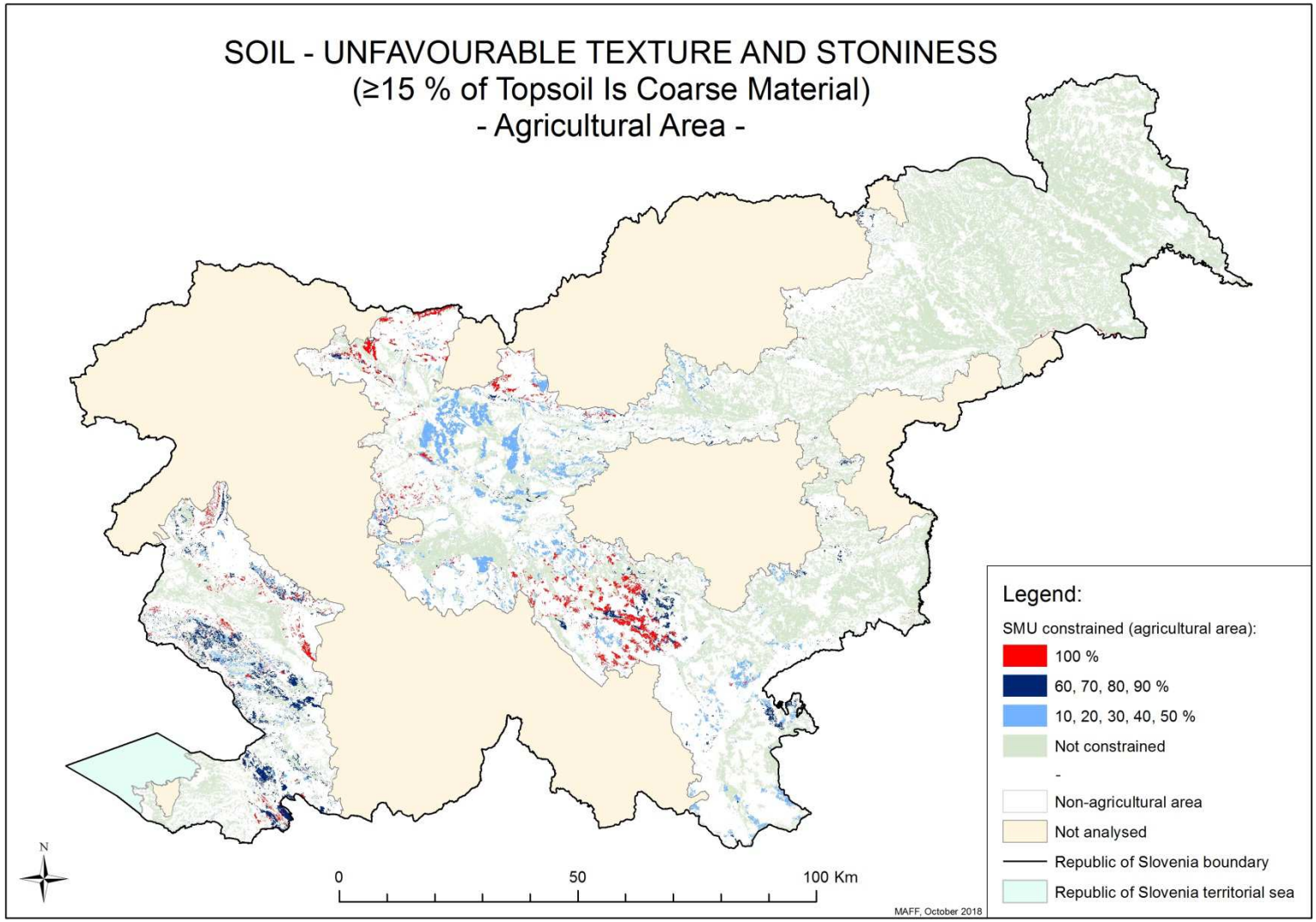


Figure 21: Soil with skeletic particles (coarse material) on agricultural land

6.3. Sandy soil texture – on agricultural land

Most of the agricultural land with the sub-criterion ‘sandy soil texture’ is located in the SMU where this constraint accounts for 100% of the area. Data shows that the presence of sandy soil in the SMU is rather dispersed and that the surface of the agricultural land where sandy soil is fully predominant accounts for less than 1/3 of agricultural land with sandy soil.

Proportion of constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land facing constraints (ha)	Proportion in the total agricultural land with constraints (%)
10	13	1	0
20	1,165	233	7
30	974	292	9
40	1,580	632	19
50	115	58	2
60	1,653	992	29
70	210	147	4
80	2	2	0
100	1,010	1,010	30
Total agricultural land facing constraints	6,722	3,367	100

Table 11: Sandy soil on agricultural land according to the proportion of the constraint in the SMU

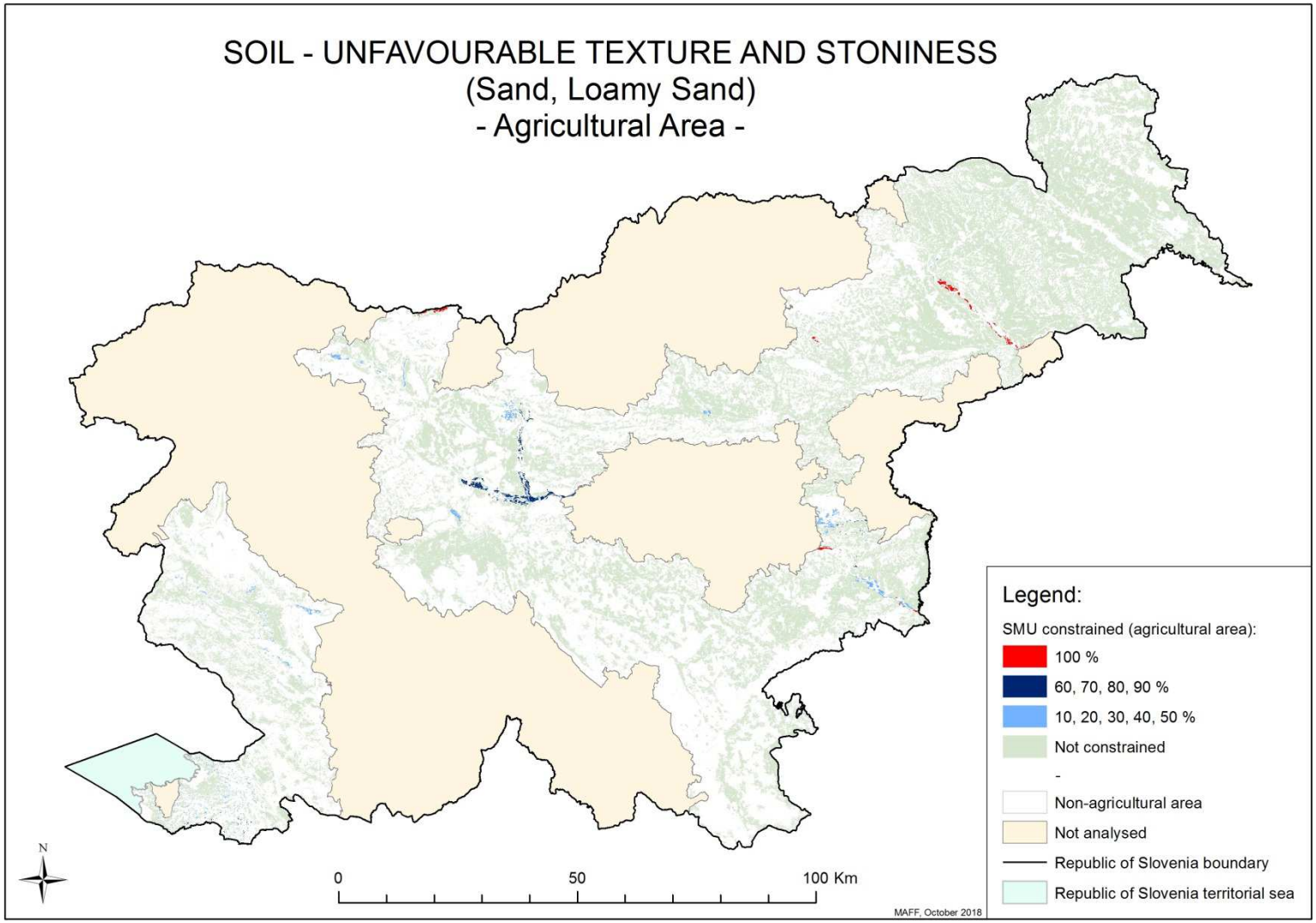


Figure 22: Sandy soil on agricultural land

6.4. Organic soil – on agricultural land

Most of the agricultural land with the sub-criterion ‘organic soil’ is located in the SMU where this constraint accounts for 100% of the area. The most typical area with predominantly organic soil is located in central Slovenia, in the area of the Ljubljana Marshes. All of agricultural land affected by the sub-criterion ‘organic soil’ is located here.

Proportion of constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land facing constraints (ha)	Proportion in the total agricultural land with constraints (%)
30	6	2	0
50	32	16	0
100	6,324	6,324	100
Total agricultural land facing constraints	6,362	6,342	100

Table 12: Organic soil on agricultural land according to the proportion of the constraint in the SMU

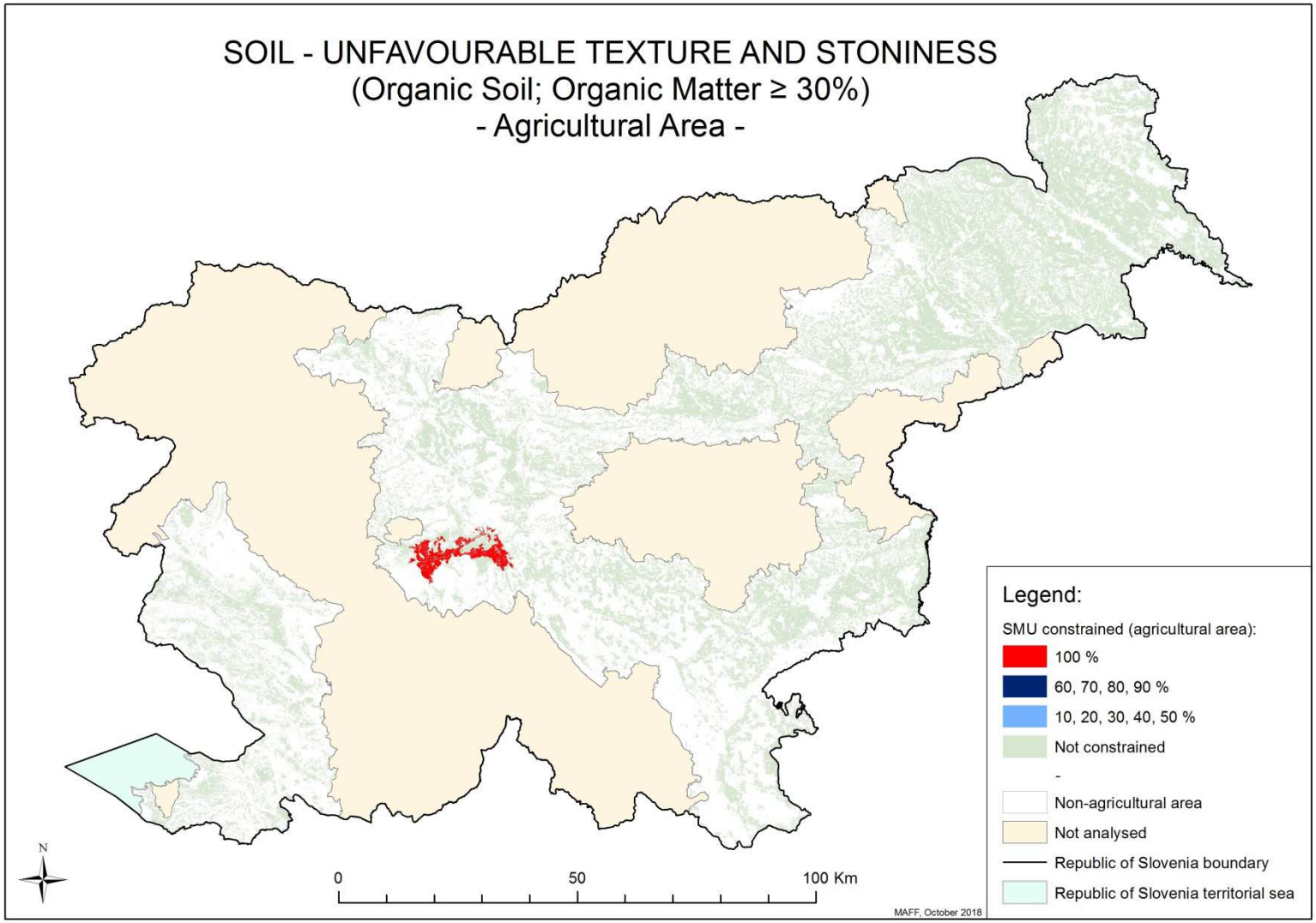


Figure 23: Organic soil on agricultural land

6.5. Limited rooting system depth – on agricultural land

Most of the agricultural land with the criterion ‘limited rooting system depth’ is located in the SMU where this constraint accounts for 50% of the area. This fact (and the great dispersion of the constraint considering its proportion in the SMU) shows how very heterogeneous the agricultural area is. This criterion also most frequently appears in karst areas.

Proportion of constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land facing constraints (ha)	Proportion in the total agricultural land with constraints (%)
10	193	19	0.1
20	14,207	2,841	13.6
30	8,286	2,486	11.9
40	3,693	1,477	7.1
50	8,982	4,491	21.5
60	469	281	1.3
70	5,815	4,070	19.5
80	557	446	2.1
90	3,234	2,911	13.9
100	1,877	1,877	9.0
Total agricultural land facing constraints	47,313	20,899	100.0

Table 13: Agricultural land with limited rooting system depth according to the proportion of the constraint in the SMU

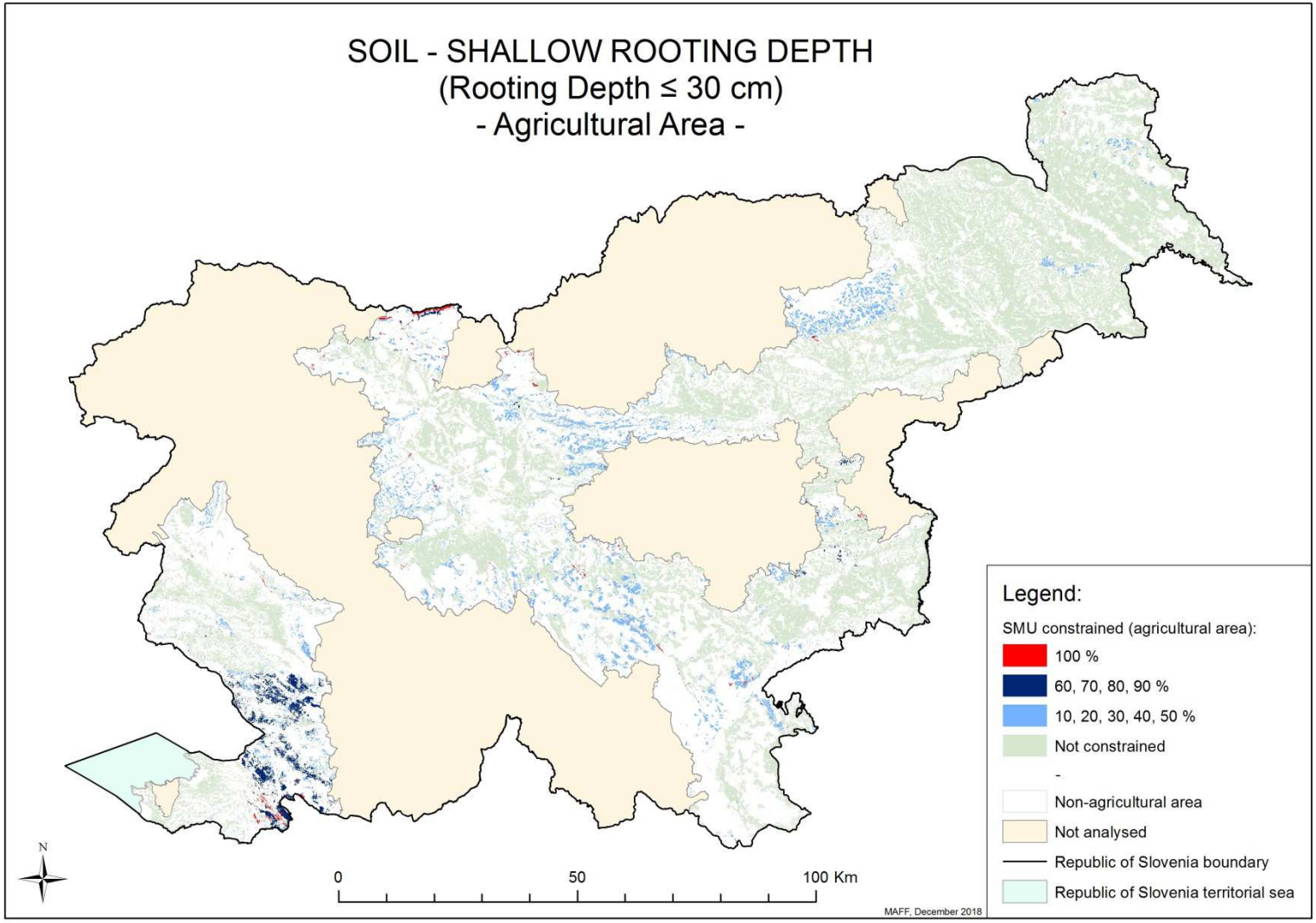


Figure 24: Soil with limited rooting system depth on agricultural land

6.6. Acidic soil – on agricultural land

Most of the agricultural land with the criterion ‘acidic soil’ is located in the SMU where this constraint accounts for 100% of the area. The criterion is most distinct and most prevalent on agricultural land in Bela Krajina.

Proportion of constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land facing constraints (ha)	Proportion in the total agricultural land with constraints (%)
10	14	1	0.0
20	6,974	1,395	10.4
30	6,459	1,938	14.4
40	3,108	1,243	9.2
50	2,540	1,270	9.4
60	364	218	1.6
70	1,829	1,280	9.5
80	281	225	1.7
90	207	186	1.4
100	5,720	5,720	42.4
Total agricultural land facing constraints	27,496	13,476	100.0

Table 14: Acidic soil on agricultural land according to the proportion of the constraint in the SMU

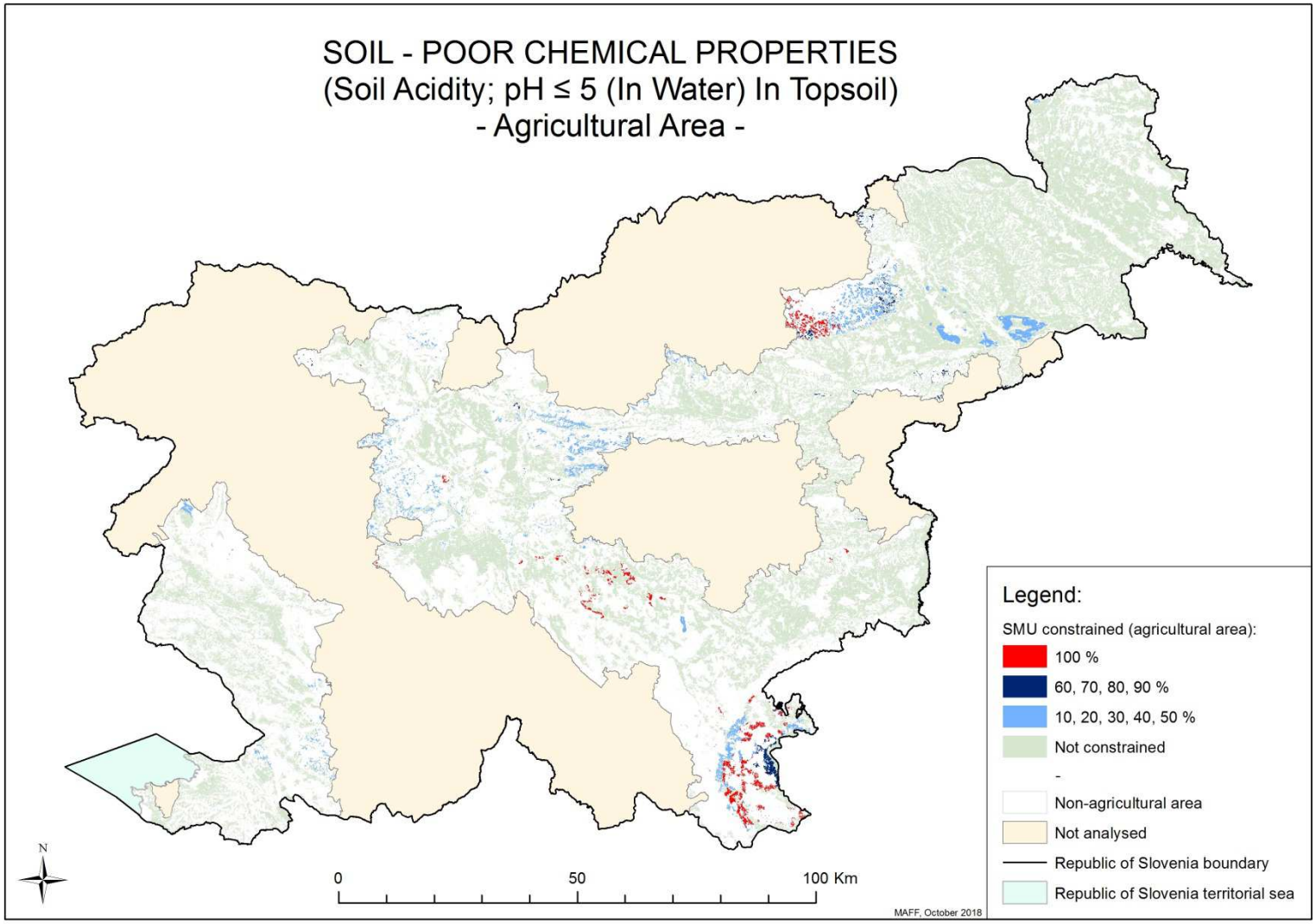


Figure 25: Acidic soil on agricultural land

6.7. Slope – on agricultural land

The slope of agricultural land is calculated and shown with preciseness to the pixel. The raster layer was then converted to polygons using ArcGIS Conversion tool Raster to Polygone. The surface of agricultural land on slope ≥ 15% is 115,024 hectares. Most of the agricultural land with the constraint ‘slope’ is located in municipalities, which are already partly delimitated as mountain area. Slope is a major constraint for agriculture also in the SMUs of the karst terrains of Bela Krajina and Suha Krajina, hilly areas of Goričko, Slovenske Gorice, and Dravinjske gorice (Figure 26).

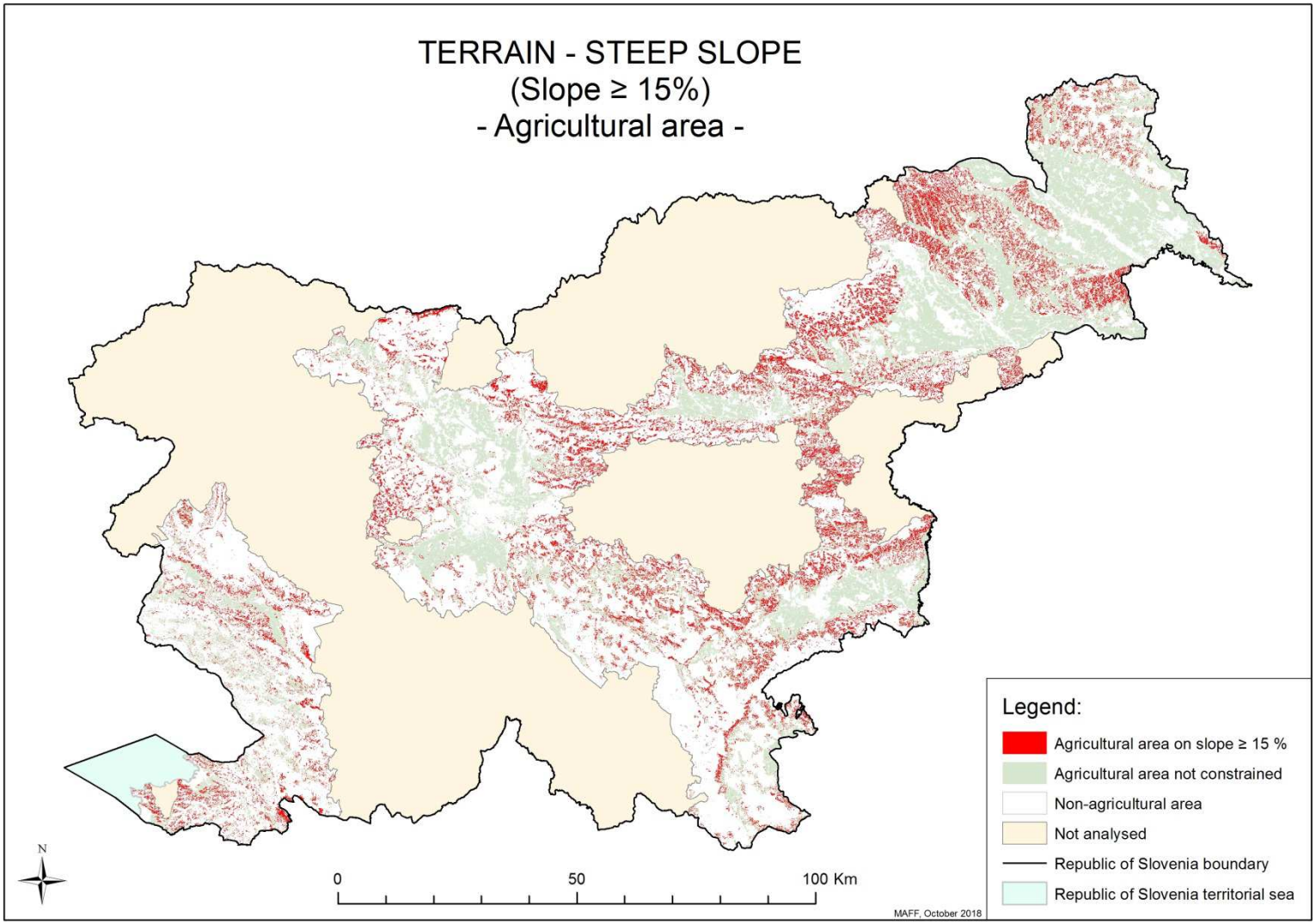


Figure 26: Slope on agricultural land

6.8. Aggregate depiction of constraints referring to the soil properties from the soil map – on agricultural land

The special feature of the spatial analysis of the criteria on agricultural land, which are proved by way of the data from the soil map, is that the affected surface of agricultural land in a particular testing ground of a SMU is calculated considering the proportion of the constraint in each individual SMU. The percentage of the constraint in a particular SMU can range from 10% to 100%.
Figure 27 shows the affected agricultural surfaces where all of the criteria in question based on the data from the soil map (criteria 6.1 – 6.6) are taken into account at the same time, whereby the agricultural surface in a SMU is **only used for the calculation once** (even though it is possible for more than one criterion to be present on the same surface at the same time) (as show in Table 15). This procedure is described in detail in chapter 7.

The calculation of the total area of agricultural surfaces taking into account the effect of all criteria at the same time can therefore be continued from here onwards only with attribute data.

Proportion of constraint in the SMU (%)	Soil map constraints added up (as shown on maps / tables for individual constraint)	Soil map constraints added up, considering combined effect (shown on map with combined constraints and applied in actual calculations)
10	92	43
20	7,907	5,570
30	7,296	4,729
40	5,048	3,406
50	8,859	4,350
60	3,886	2,759
70	11,486	8,796
80	5,083	4,491
90	6,182	3,085
100	78,501	74,123
Total agricultural land facing constraints	134,340	111,352

Table 15: Overview of surfaces with constraints, based on the data from the soil map, SMU level

The spatial analysis of the criterion ‘slope’ is performed ‘graphically.’ For this reason, agricultural land that meets the criterion ‘slope’ can be located with precision to the “pixel”. Agricultural area facing constraints from the soil map and slope are shown on Figure 28.

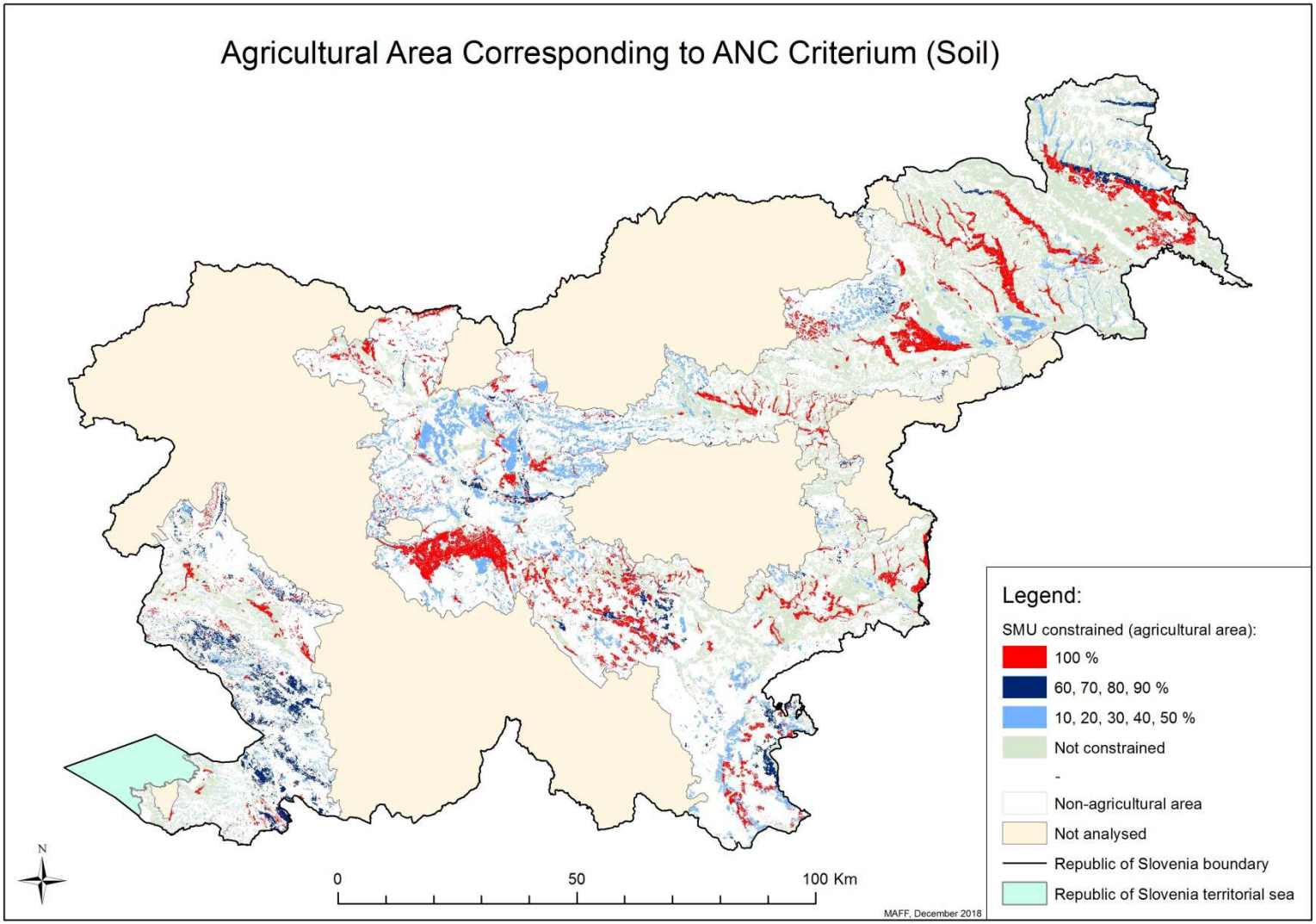


Figure 27: Agricultural area facing constraints from the soil map, SMU level

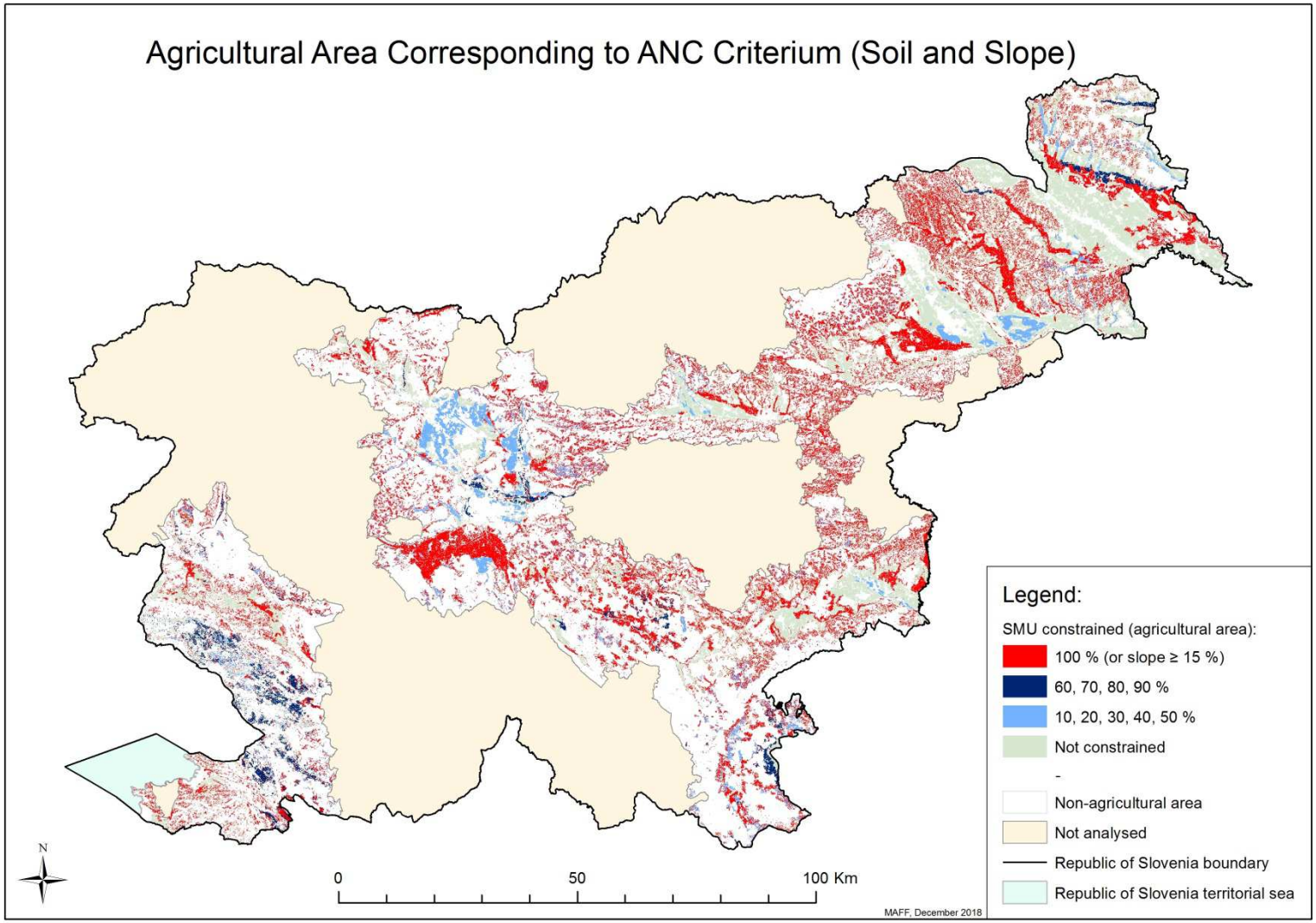


Figure 28: Agricultural area facing constraints from the soil map and constrain slope

6.9. A fine-tuning exercise due to investments into the improvement of the water regime

Areas with limited drainage can be improved by installing drainage systems. Therefore, all agricultural areas with limited drainage with functioning drainage systems must be excluded from the future procedure for determining ANCs.

The entire drainage system is shown on Figure 29. The procedure for excluding agricultural land that had been improved by way of drainage systems was as follows: areas were identified by intersecting the layer of working drainage systems with layer of limited drainage from soil map and layer of agricultural land. The agricultural areas which resulted from this intersection were excluded from the next steps of analysis. The surface area of the agricultural land on which the criterion ‘limited soil drainage’ is present but has been excluded due to functioning drainage systems covers 19,016 hectares. This situation is shown on Figure 30.

The data on agricultural land with limited soil drainage constraint prior and after the implementation of the above mentioned fine-tuning exercise is shown in Table 16. As shown in the table, only 32,227 ha (out of 51,243 ha of limited drainage, not located on steep slope) remain constrained after the fine-tuning exercise and only this area is applied in further analysis.

		Prior to the fine-tuning exercise		After the fine-tuning exercise	
Proportion of the constraint in the SMU (%)	Agricultural land in the SMU (ha)	Agricultural land with constraints (ha)	Agricultural land with constraints **minus** slope (ha)	Drainage systems on agricultural land (ha)	Agricultural land facing constraints (ha) after the fine-tuning exercise
20	624	125	119.4	59.8	59.7
30	3,150	945	875.2	236.2	639.0
40	594	238	235.6	147.6	88.1
50	1,937	968	951.5	595.1	356.5
60	2,070	1,242	1,239.0	813.8	425.2
70	24	17	16.3	0.0	16.3
80	753	602	596.5	256.8	339.7
100	47,849	47,849	47,209.2	16,906.6	30,302.6
Total agricultural land facing constraints	57,001	51,986	51,242.7	19,015.8	32,227.0

Table 16: Gleyic colour pattern within 40 cm from the surface prior and after fine-tuning exercise

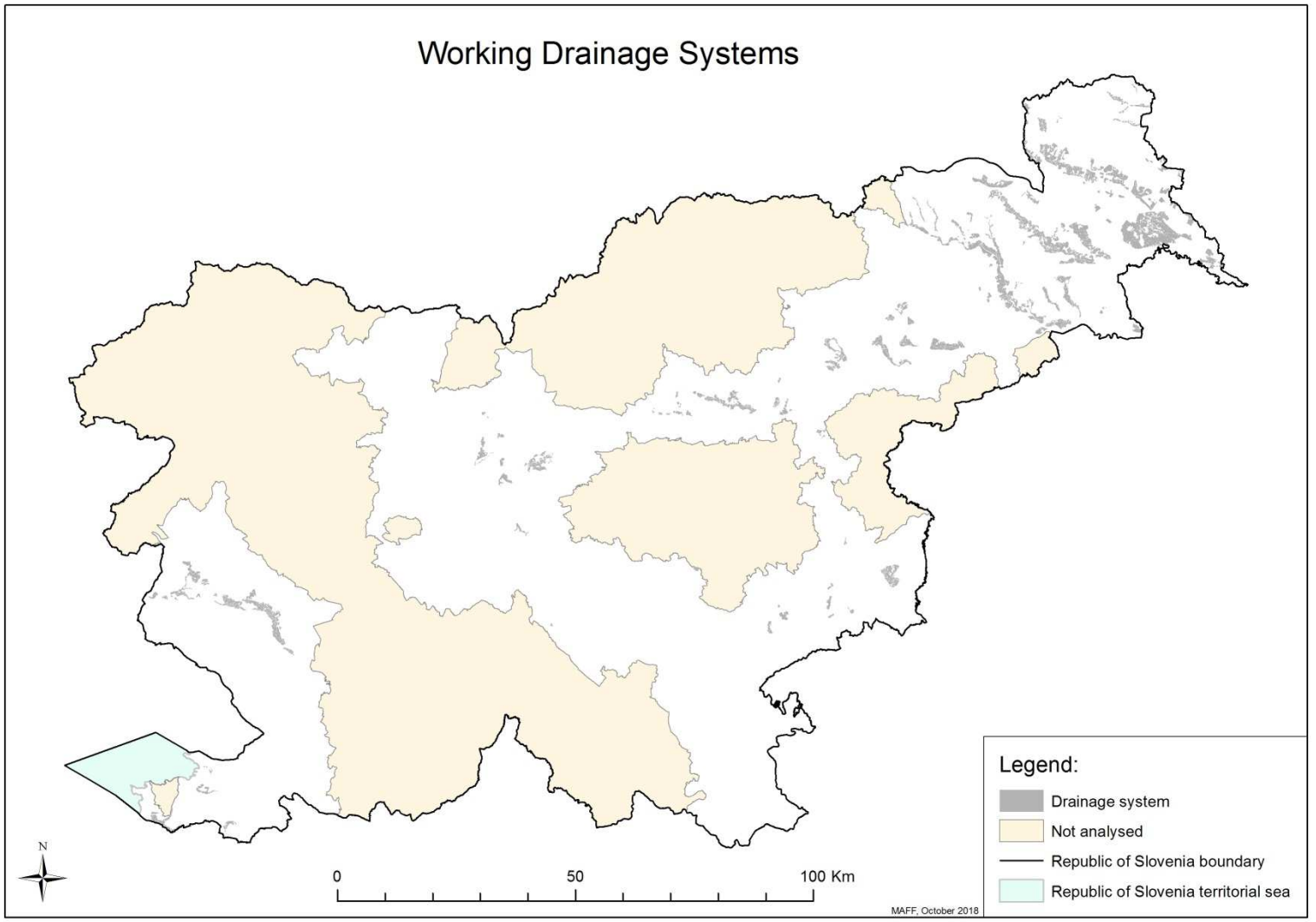


Figure 29: Functioning drainage systems in Slovenia

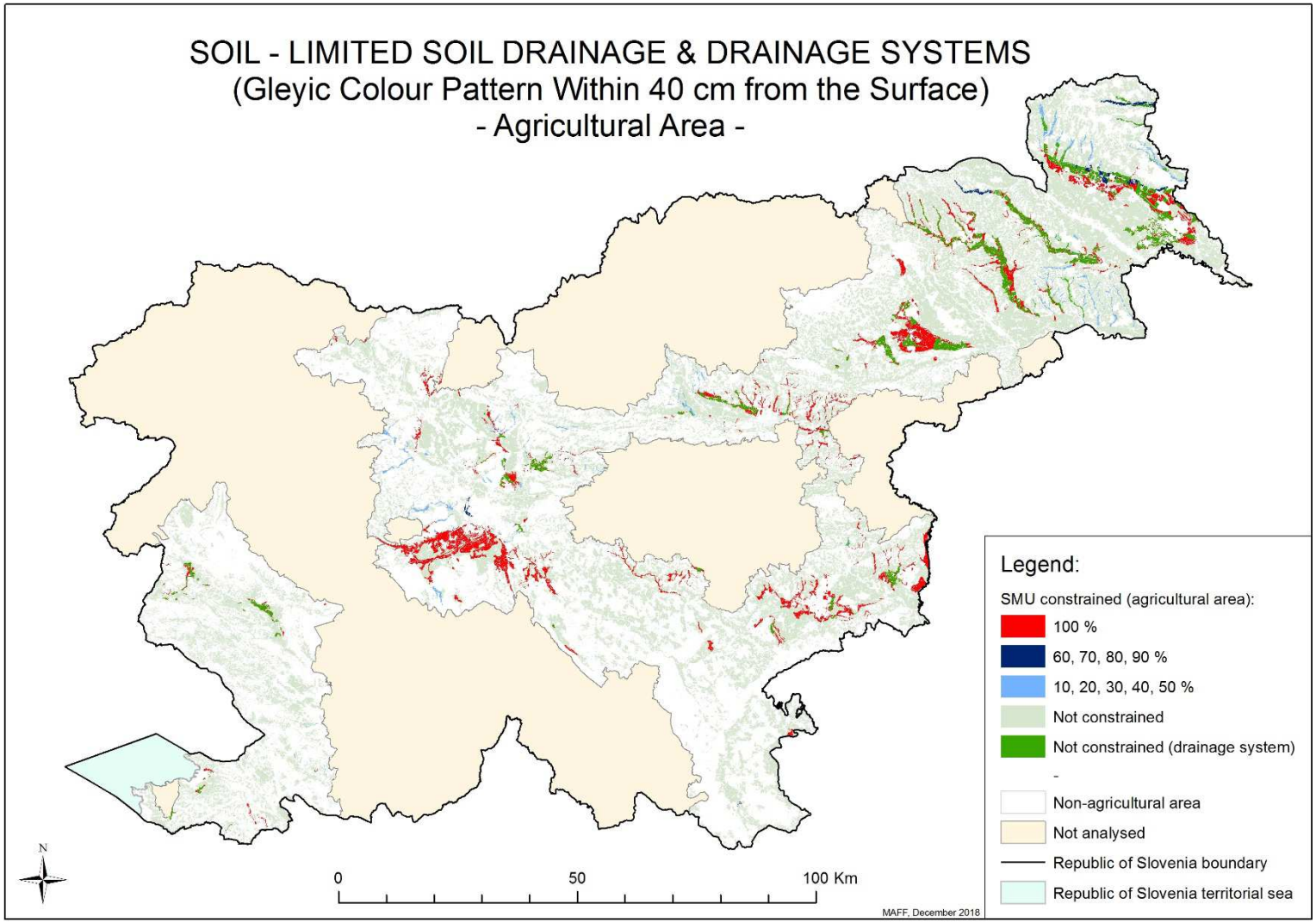


Figure 30: Fine tuning with functioning drainage systems on constrained agricultural area

7. Aggregation at the level of the administrative unit

Regulation No 1305/13 lays down the use of a local administrative unit (LAU 2 level) or the level of a clearly delineated local unit which covers a single clear contiguous geographical area with a definable economic and administrative identity.

The Report, version 1, from April 2018, where Slovenia as an administrative unit suggested the usage of natural geographical unit based on cadastral unit, was not accepted by the EC. During a videoconference on 18 July 2018, Slovenia and EC agreed to use a local administrative unit (LAU2). As the valid mountain area delimitation is based on the cadastral units borders or, only exceptionally, on parts of cadastral units which do not correspond to LAU2 border, an agreement has been reached, namely that the ANC delimitation analysis shall encompass all municipalities (LAU2) which have at least part of its area outside mountain area. Slovenia has 212 municipalities; however, this new approach is met by 130 municipalities (LAU2).

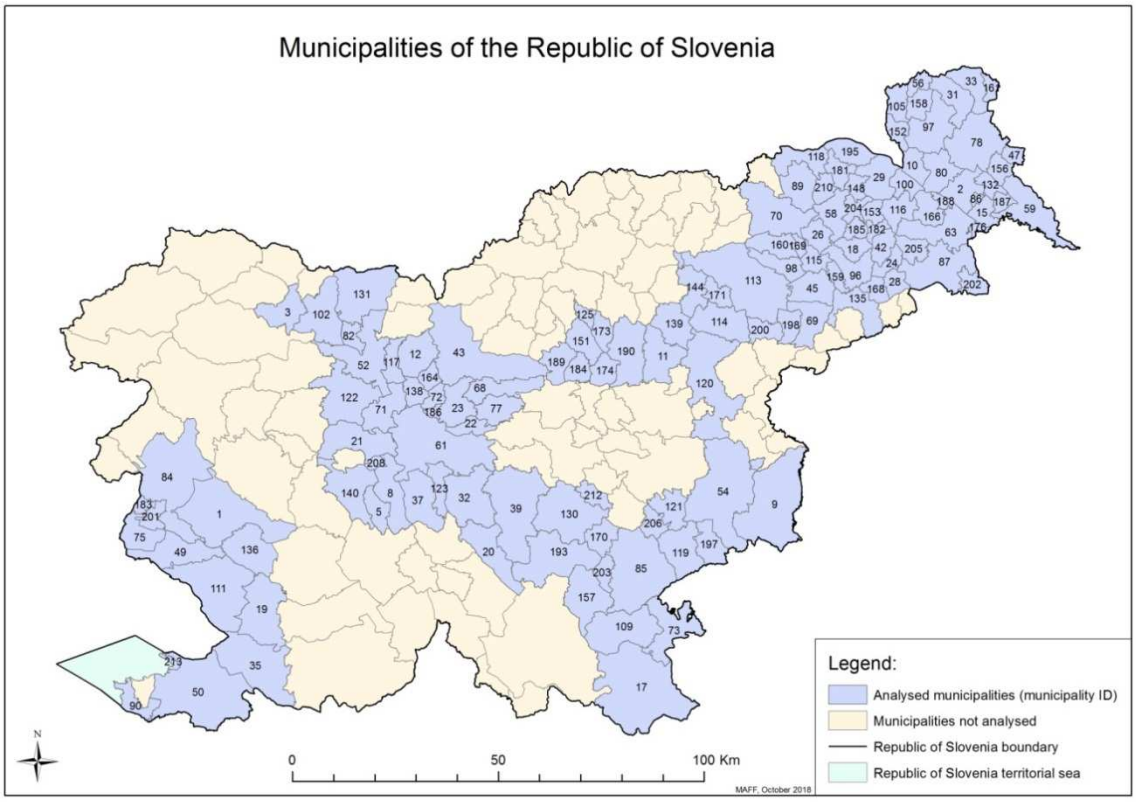


Figure 31: Borders of municipalities (LAU2) in Slovenia

The calculation of the area of agricultural land affected by the 8 biophyisical criterion is made for each SMU separately because the SMU is the unit that carries information on the extent of the restriction for biophyisical criterion (from

10% to 100%) in the area concerned. The results on SMUs are furtheron aggregated to LAU2.

In this chapter, the procedure of calculating UAA under constraints on the level of LAU2 is explained. Because of the complexity of calculating procedures an example of LAU2 Domžale (LAU ID 23) is presented and the results are given in Table 17.

First part of the analysis: Intersection of soil map and LAU 2:
Columns A (): LAU2 ID
Columns B: LAU2 NAME
Columns C: Contain data on unique SMUs
Columns D – J: contain information on various pedological criterions/constraints that derive from soil map. Each of these criterions can have constraining impact on UAA from 0 to 100 %. Columns D – J include data on constraints that derive from soil map directly
Column D: Criterion Limited soil drainage (LSD)
Column E: Criterion Coarse material (CM)
Column F: Criterion Sand (SAND)
Column G: Criterion Clay (CLAY)
Column H: Criterion Organic soil (ORG)
Column I: Criterion Shallow Rotting Depth (SRD)
Column J: Criterion Soil Acidity (pH)
Column K: The sum of criteria from columns E – J.

In case of more than one constraint per SMU, the combination of constraints was appropriately considered. Sum of the constraints was calculated by taking into account the specifics of constraints combinations in each SMU. For example, the sum of constraints for SMU 1226 is 40 % (column K), even though each of the two criterions constrained within this SMU have the constraint of 40 % (columns J & K). On the other hand, the sum of constraints for SMU 1095 is 100 %, because the combination of constraints within this SMU (columns E – 60%, F - 40% and I – 40%) has the effect of constraining that particular SMU by 100 %. Criterion LSD (column D) was not taken into account in this sum (column K), because its influence on constraints is dependent of (possible) drainage systems and was therefore applied in later step of analysis.

Second part of the analysis, graphical operations in ArcGIS:
Column L (UAA): intersection of soil map and UAA map,
Column M (SLOPE): intersection of resulting map from previous step (column L) and slope map - **first partial result,**
Column N (D_SIST): intersection of limited soil drainage layer, UAA map and drainage system map.

Third part, calculations on the basis of data derived from previous steps:
Column O (L-M): UAA that is not on slope,
Column P (O*(D/100)): UAA with LSD constraints – slope, corrected by applying the % of SMU constraint,
Column Q (P-N): UAA with LSD constraints (- slope, corrected by % of SMU constraint), that are not overcome by drainage systems **- second partial result**,
Column R (O-Q): UAA – UAA on slope - UAA constrained by LSD neto,
Column S (R*(K/100)): UAA - UAA slope - UAA constrained by LSD, corrected by applying the % of SMU constraint sum **- third partial result,**
Column T (UAA_UC): UAA under constraints (T=M+Q+S) - **final result**.

LAU 2		SOIL MAP (1st part)									GRAPHICAL OPERAT. (2st part)			NUMERICAL CALCULATIONS (3nd part)					
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
LAU 2 ID	LAU2 NAME	SMU	LSD_ %	CM_%	SAND _%	CLAY _%	ORG _%	SRD _%	pH_ %	CRIT_ E-J_%	UAA	SLOPE	D_SIST	L-M	O*(D/ 100)	P-N	O-Q	R*(K/100)	UAA_UC
			%								ha								
23	DOMŽALE	232	0	0	0	0	0	0	0	0	31.94	21.25	0.00	10.69	0.00	0.00	10.69	0.00	21.25
23	DOMŽALE	478	0	0	0	0	0	0	0	0	69.42	0.00	0.00	69.42	0.00	0.00	69.42	0.00	0.00
23	DOMŽALE	486	100	0	0	0	0	0	0	0	213.91	0.55	161.52	213.36	213.36	51.84	161.52	0.00	52.39
23	DOMŽALE	585	100	0	0	0	0	0	0	0	249.00	0.01	75.76	248.99	248.99	173.24	75.76	0.00	173.24
23	DOMŽALE	991	0	0	0	0	0	0	0	0	52.71	0.00	0.00	52.71	0.00	0.00	52.71	0.00	0.00
23	DOMŽALE	1095	0	60	40	0	0	60	0	100	39.25	0.03	0.00	39.22	0.00	0.00	39.22	39.22	39.25
23	DOMŽALE	1121	100	0	0	0	0	0	0	0	319.41	2.01	215.22	317.40	317.40	102.19	215.22	0.00	104.20
23	DOMŽALE	1166	30	0	0	0	0	0	0	0	70.35	0.08	5.84	70.27	21.08	15.24	55.03	0.00	15.32
23	DOMŽALE	1226	0	0	0	0	0	40	40	40	38.53	28.99	0.00	9.55	0.00	0.00	9.55	3.82	32.81
23	DOMŽALE	1247	0	30	0	0	0	0	0	30	363.14	0.00	0.00	363.14	0.00	0.00	363.14	108.94	108.94
23	DOMŽALE	1260	0	80	0	0	0	0	0	80	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07
23	DOMŽALE	1261	0	20	0	0	0	0	0	20	223.63	141.49	0.00	82.14	0.00	0.00	82.14	16.43	157.92
23	DOMŽALE	1262	0	20	0	0	0	0	0	20	340.75	0.13	0.00	340.61	0.00	0.00	340.61	68.12	68.25
23	DOMŽALE	1265	0	0	0	0	0	70	70	70	21.62	14.96	0.00	6.66	0.00	0.00	6.66	4.66	19.62
23	DOMŽALE	1266	0	0	0	0	0	20	0	20	0.29	0.16	0.00	0.13	0.00	0.00	0.13	0.03	0.19
23	DOMŽALE	1268	0	0	60	0	0	0	0	60	283.93	3.97	0.00	279.96	0.00	0.00	279.96	167.98	171.95
23	DOMŽALE	1269	0	0	0	0	0	0	0	0	137.25	0.00	0.00	137.25	0.00	0.00	137.25	0.00	0.00
23	DOMŽALE	1270	0	0	0	0	0	0	0	0	24.36	0.12	0.00	24.25	0.00	0.00	24.25	0.00	0.12
23	DOMŽALE	1271	0	0	0	0	0	0	0	0	153.79	4.12	0.00	149.67	0.00	0.00	149.67	0.00	4.12
23	DOMŽALE	1272	0	0	0	0	0	0	0	0	116.19	5.50	0.00	110.69	0.00	0.00	110.69	0.00	5.50
23	DOMŽALE	1273	0	0	0	0	0	0	0	0	26.25	0.26	0.00	25.99	0.00	0.00	25.99	0.00	0.26
23	DOMŽALE	1274	100	0	0	0	0	0	0	0	130.85	0.89	65.68	129.96	129.96	64.28	65.68	0.00	65.17
23	DOMŽALE	1385	0	0	0	0	0	0	0	0	189.26	64.44	0.00	124.82	0.00	0.00	124.82	0.00	64.44
											3095.90								**1104.99**	**36 %**

Table 17: Sequence of the calculation method for the Domžale municipality case

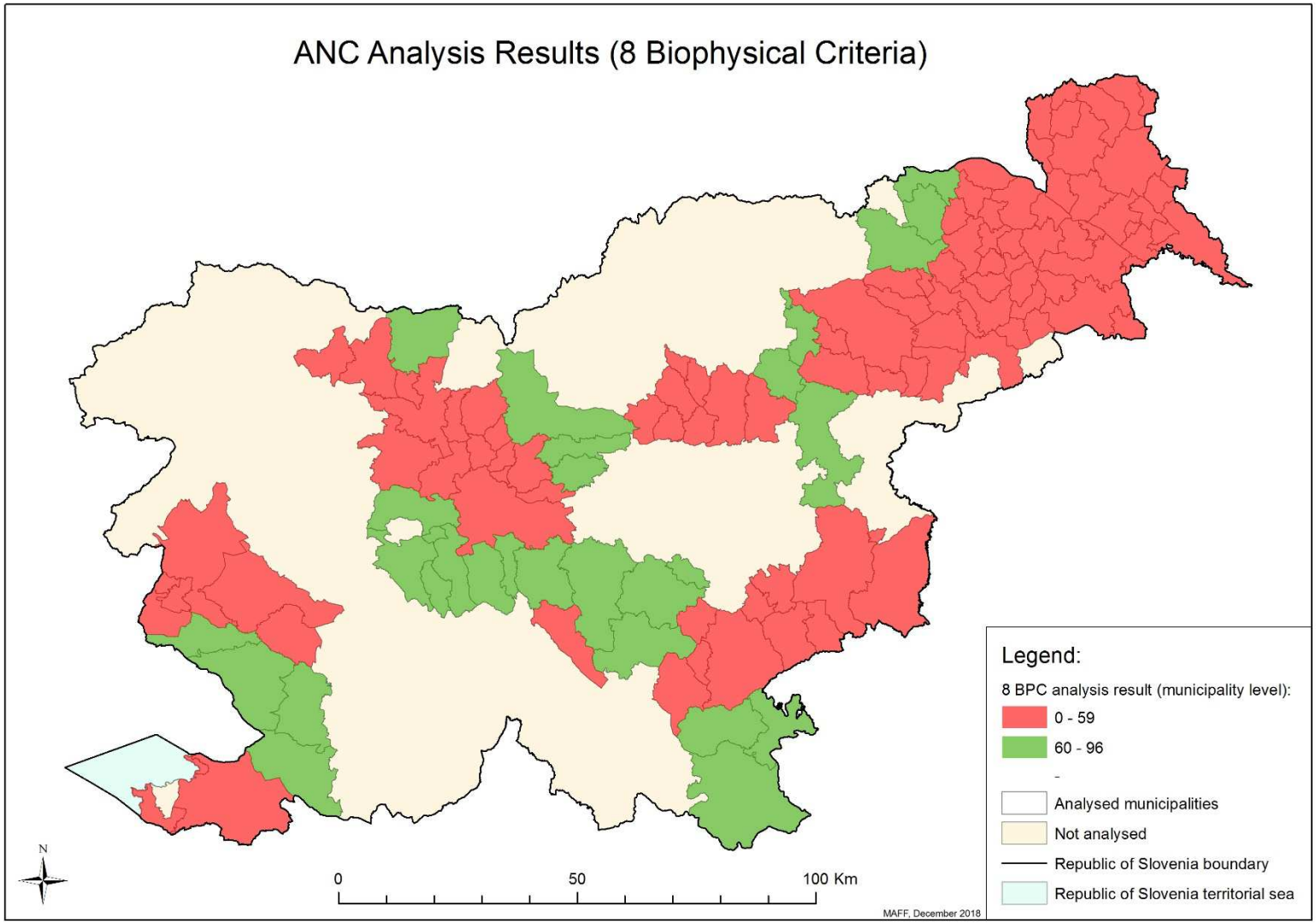


Figure 32: The result of the analysis of 8 BFK by municipalities

OB_ID	OB_IME	SUM UAA (ha)	UAA under 8BPC (ha)	%
193	ŽUŽEMBERK	3685	3548	96
208	LOG-DRAGOMER	473	445	94
8	BREZOVICA	3154	2908	92
123	ŠKOFLJICA	1823	1596	88
140	VRHNIKA	3670	3190	87
144	ZREČE	1982	1660	84
5	BOROVNICA	1191	991	83
43	KAMNIK	5889	4521	77
21	DOBROVA-POLHOV GRADEC	3140	2336	74
68	LUKOVICA	2275	1677	74
131	TRŽIČ	2389	1739	73
37	IG	3493	2515	72
109	SEMIČ	2413	1747	72
120	ŠENTJUR	9888	7110	72
35	HRPELJE-KOZINA	3898	2766	71
77	MORAVČE	2397	1709	71
19	DIVAČA	3531	2480	70
17	ČRNOMELJ	7103	4924	69
139	VOJNIK	2957	2040	69
118	ŠENTILJ	2948	2025	69
130	TREBNJE	6154	4191	68
32	GROSUPLJE	4481	3000	67
49	KOMEN	2940	1956	67
111	SEŽANA	5856	3712	63
89	PESNICA	5019	3168	63
73	METLIKA	3940	2456	62
212	MIRNA	1047	633	61
70	MARIBOR	4726	2865	61
39	IVANČNA GORICA	7385	4430	60

Table 18: List of 29 municipalities that fulfil the biophysical criteria

8. Fine-tuning exercise

Article 32(3) of the 2014–2020 Rural Development Regulation lays down the following: *When delimiting the areas concerned by this paragraph, Member States shall carry out a fine-tuning exercise, based on objective criteria, with the purpose of excluding areas in which significant natural constraints, referred to in the first subparagraph have been documented but have been overcome by investments or by, economic activity, or by evidence of normal land productivity, or in which production methods or farming systems have offset the income loss or added costs referred to in Article 31(1).*
The fine-tuning exercise was applied after using biophysical criteria. In this chapter, the process of fine-tuning (the selection, description and application of the fine-tuning), is presented in detail.

8.1 Overcoming natural constraints by investments

Drainage systems (artificial drainage)
Slovenia has already used a map of functioning artificial drainage systems in the delimiting procedure, i.e. in the analysis of the 'limited soil drainage' criterion, so it simply excluded the land where this investment is present. The procedure is described in greater detail in chapter 6.1.

8.2 Overcoming natural constraints through economic activities

Standard output

In the European Union, the economic size and farming type (i.e. typology) have been determined since 2010 on the basis of standard output (SO). Standard output is a relatively simple economic indicator that, by definition, reflects the average production value, which can be expected (in individual countries) by an agricultural holding, considering their production structure. It is calculated on the basis of the average gross value of agricultural production per unit at the national level (i.e. SO coefficients) and production indicators of individual agricultural holdings (surfaces, number of animals). The method for calculating SO and derived indicators (economic size class, farming type) is prescribed through a single method at the EU level (EC, 2009).

SO and derived indicators are only calculated and published within the scope of statistical studies of agricultural holding structure, and they are mainly intended for analysing structural and economic properties of agricultural holdings at an aggregate level. The broader application of SO as an economic indicator for agricultural holdings is already limited by the manner of performing structure

surveys, which includes sample surveys every two or three years, and a full survey only every 10 years, and even more so by the strict limitations with regard to using individual data (personal data protection).

Calculating SO on Agricultural Holding (hereinafter AH) level

These limitations can be at least partly avoided if the SO is calculated and accessible outside of statistical studies. For this reason, the Ministry of Agriculture, Forestry and Food (hereinafter: the MAFF) stipulated a task within the Target Research Programme that should verify the possibility of calculating the SO for individual agricultural holdings on the basis of administrative data sources. The MAFF has at its disposal a lot of data on agricultural holdings and their production parameters, which are comparable to the data that is otherwise provided by structure surveys (Agriculture Act). Within the restrictions laid down by the Agriculture Act, the MAFF could also use this data for its own needs at an individual level, which is not possible for statistical data.

The basic goal of the study was to calculate the SO at the level of an individual agricultural holding on the basis of the production parameters arising from administrative sources or databases of the MAFF.

The task was assumed by the Agricultural Institute of Slovenia, which calculated the SO for 2012, 2013, and 2014 in accordance with the request of the MAFF.
The SO was calculated using the data and procedures described below.

<u>Administrative databases of the Ministry of Agriculture, Forestry and Food</u>
The data used for calculating production parameters at agricultural holdings were:

- The surface and the category of agricultural land use (LPIS – part of Register of Agricultural Holdings; hereinafter: RAH),
- The number, types, and categories of animals, and data on the number of bee families (Various databases on animals).

Entry into the Register of Agricultural Holdings is mandatory for all agricultural holdings that meet at least one of the following conditions:

- they use: (i) at least 1 ha of land that is classified as agricultural land according to the record of the actual use of agricultural and forest land, or (ii) at least 0.1 ha of olive groves, or (iii) at least 0.2 ha of intensive orchards or 0.1 ha of land for berries or 0.1 ha of land for nuts, or (iv) a hop field, or (v) at least 0.05 ha of vineyards;
- they keep animals and rear cattle, equine animals, sheep and goats, more than one pig, bees, game in an enclosure, alpacas, lamas, snails, aquatic animals, poultry, or rabbits, with the exception of those holdings keeping

animals that only keep poultry or rabbits and their number does not exceed 50 beaks, 5 ostriches, or 50 rabbits;
- they market the produce that they produce;
- they carry out any of the measures of the agricultural policy.

The threshold for entering agricultural holdings in the RAH is therefore lower than the threshold for the size of agricultural holdings used by the Statistical Office of the Republic of Slovenia (SURS) for the calculation of the SO. Consequently, more agricultural holdings (an average of 93,954 AHs annually) are included in the analysis of the Agricultural Institute of Slovenia than in the SI-STAT analysis (72,277 AHs in 2013).

SO calculation method

The methodology for calculating the SO of an agricultural holding and the derived indicators (economic size, farming type) is based on the single methodology in the EU (EC, 2009), adjusted in the operative part to the level of data available in administrative sources. The basic principles of adjustment were to include in the calculation of the SO as many agricultural holdings as possible and to calculate the SO for individual agricultural holdings as precisely as possible. For this reason, additional coefficients at various levels were calculated in addition to the standard coefficients, and a combination of the data from administrative sources, allowing these coefficients to be assigned at a level that is as detailed as possible, was selected.

A list of items for the calculation of SO coefficients within structure surveys (Statistical Office of the Republic of Slovenia – SURS) was complemented with products at a more detailed level (where the available statistical data allow the calculation of relevant SO coefficients) for the purpose of coordinating with the list of the data that is available in administrative sources. All SO coefficients, including additional ones, were calculated using the single EU methodology. Calculations were applied for 2012, 2013, and 2014, which matches the years for which we also obtained data from administrative sources on surfaces and the number of animals.

The general principle, when selecting the data from administrative source, was to select the data that can be applied on the most detailed level possible, preferably on agricultural holding level. Following, the data from sources, that allow appropriate SO coefficients to be assigned according to plant types or animal categories were used first, and only then the data at more aggregate levels were used.
The obtained SO results are shown in tables 19 and 20.

Year	2012	2013	2014
Number of AHs	92,547	93,884	95,430
Agricultural area of AHs (in ha)	480,459	482,039	483,609
Total SO (in million EUR)	1,137.8	1,110.2	1,128.3

Table 19: Data on the included number of agricultural holdings, agricultural area of agricultural holdings and the total SO in the 2012–2014 period in Slovenia

	Slovenia	Mountain area	Outside of the mountain area
Agricultural area (ha)	482,036	245,444	236,593
SO (in million EUR)	1,125.4	471.2	654.2
SO / ha (EUR)	2,335	1,920	**2,765**

Table 20: Average values from the SO analysis for the 2012–2014 period

Slovenia took into account the comment of the DG AGRI that the SO/agricultural holding is not a suitable for fine-tuning and that a SO/ha should be used. We calculated SO/ha and used 90% threshold because this excludes a significant part of the area that meets biophysical criteria and, for these areas, we consider that economic activity have overcome natural handicaps.

When using SO within the fine-tuning exercise, average SO/ha for Slovenia was calculated in first step. Average SO/ha of those AH, whose headquarters is located in mountain area, was calculated in second step. Finally, average SO/ha of those AH, whose headquarters is not located in mountain area was calculates (see table 21).

Some additional information is needed to explain average SO in mountain area. In calculation of mean SO of the mountain area, those AH, which are located in cadastral municipalities, which are fully included into the mountain area, were taken into account. However, some cadastral municipalities are included in the mountain area only partly, while the remaining parts are included in areas facing specific constraints or are not included in ANCs. AH in these cadastral municipalities were taken into account when calculating average SO outside of the mountain area.

	SO / ha (EUR)
Slovenia	2335
Mountain area	1920
Outside of the mountain area	2765
90% of SO outside of the mountain area	**2488**

Table 21: Average SO for main areas

All 29 municipalities that met the biophysical criteria were included in the fine tuning exercise. Average SO was calculated for each municipality (LAU2) in analysis. Those municipalities, which average SO per ha exceeded € 2,488, were excluded from the ANC delimitation because they exceeded the threshold of 90% SOs as calculated for the area outside the mountain area. The result of tine tuning approach is presented in table 22. Out of 29 municipalities, which have entered the fine tuning exercise, 26 were below the threshold of 2488 EUR, while 3 were above the threshold.

	Number of LAU 2	UAA in ha
8 BPC >=60%	29	109,847
SO <=2,488 €	26	90,214
SO > 2,488 €	3	19,633

Table 22: The effect of the fine-tuning approach

Those 26 municipalities, which have met the fine tuning criteria, are listed in the table below.

OB_ID	OB_IME	SUM UAA (ha)	% BPC	SO_AVG (2012-2014) in € / ha
35	HRPELJE-KOZINA	3,898	71	995
19	DIVAČA	3,531	70	1,199
37	IG	3,493	72	1,289
193	ŽUŽEMBERK	3,685	96	1,290
8	BREZOVICA	3,154	92	1,399
131	TRŽIČ	2,389	73	1,427
140	VRHNIKA	3,670	87	1,479
109	SEMIČ	2,413	72	1,482
123	ŠKOFLJICA	1,823	88	1,485
5	BOROVNICA	1,191	83	1,502
17	ČRNOMELJ	7,103	69	1,716
208	LOG-DRAGOMER	473	94	1,729
21	DOBROVA-POLHOV GRADEC	3,140	74	1,752
39	IVANČNA GORICA	7,385	60	1,757
111	SEŽANA	5,856	63	1,797
32	GROSUPLJE	4,481	67	1,807
68	LUKOVICA	2,275	74	1,825
139	VOJNIK	2,957	69	1,830
77	MORAVČE	2,397	71	1,839
144	ZREČE	1,982	84	1,846
73	METLIKA	3,940	62	2,097
49	KOMEN	2,940	67	2,115

43	KAMNIK	5,889	77	2,228
212	MIRNA	1,047	61	2,282
118	ŠENTILJ	2,948	69	2,299
130	TREBNJE	6,154	68	2,474

Table 23: List of 26 municipalities which fulfill 8 BPC and fine-tuning

The total area of agricultural land in these 26 municipalities is 90214 ha. As in these 26 LAU2 areas, 40319 ha of UAA are already mountain areas, 49895 ha of UAA is eligible as naturally constrained areas.

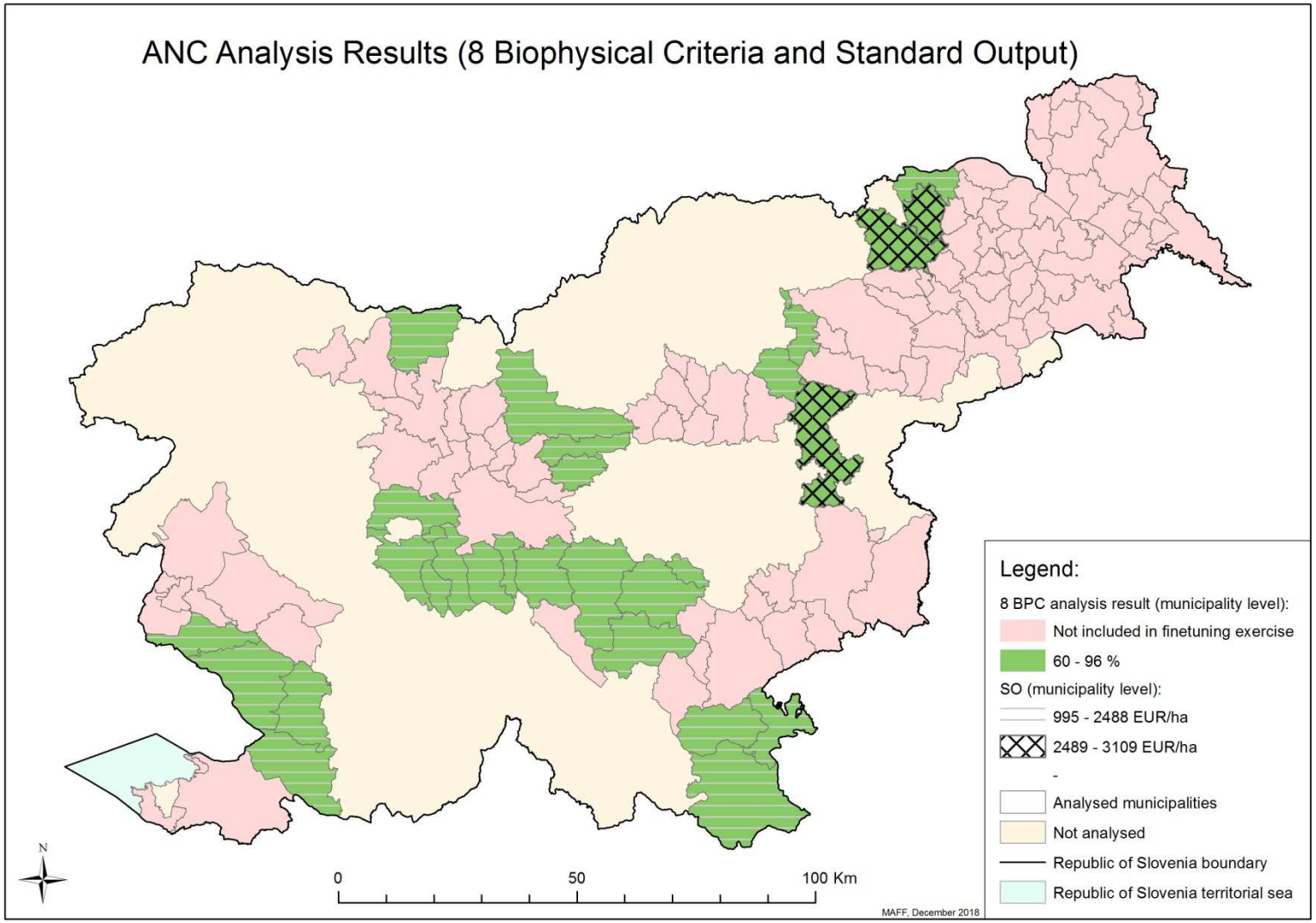


Figure 33: The result of the analysis of 8 BFK and fine-tuning (SO) by municipalities

9. Conclusion and final delimitation results

In accordance with guidelines we have conducted following results:

	Art.18	Art.19	Art.20	Not LFA
Total Agricultural area (ha)	336,420	21,528	97,357	148,848

Table: 24: Previous (LFA) delimitation (EC 1698/2005)

	Art. 19 Agricultural area (ha)	Not Art. 19 (outside Art 18) Agricultural area (ha)	Total Agricultural area (ha)
ANC »natural constraints other than mountain«	20,838	35,091	55,929
Not ANC »natural constraints other than mountain«	0	211,114	211,114
*Mountain**	*690**	-	-
Total	20,838	246,205	267,043

Table 25: Calculated delimitation with bio-physical criteria (Areas with Natural Constraints) before Fine-tuning

* As agreed by the EC and MAFF at the videoconference on 16th October, after the completion of the delimitation, the entire municipality of Dobrepolje is classified into a mountainous region. Additional area of agricultural land from the municipality of Dobrepolje classified in the mountain area is 690 ha. These 690 ha, so far in article 19, are also shown in the table, but are not counted in the total.

ANC situation in the Slovenia

	ANC »mountain« Art. 32.1.a)	ANC »other than mountain« Art. 32.1.b)	ANC »Specific« Art. 32.1.c)
Total Agricultural area (ha)	337,110	49,895	73,284

Table 26: ANC delimitation following regulation EU 1305/2013, Art.32 (after Fine tuning)

The map of Slovenian proposal for ANCs is presented on the next page - Figure 34.

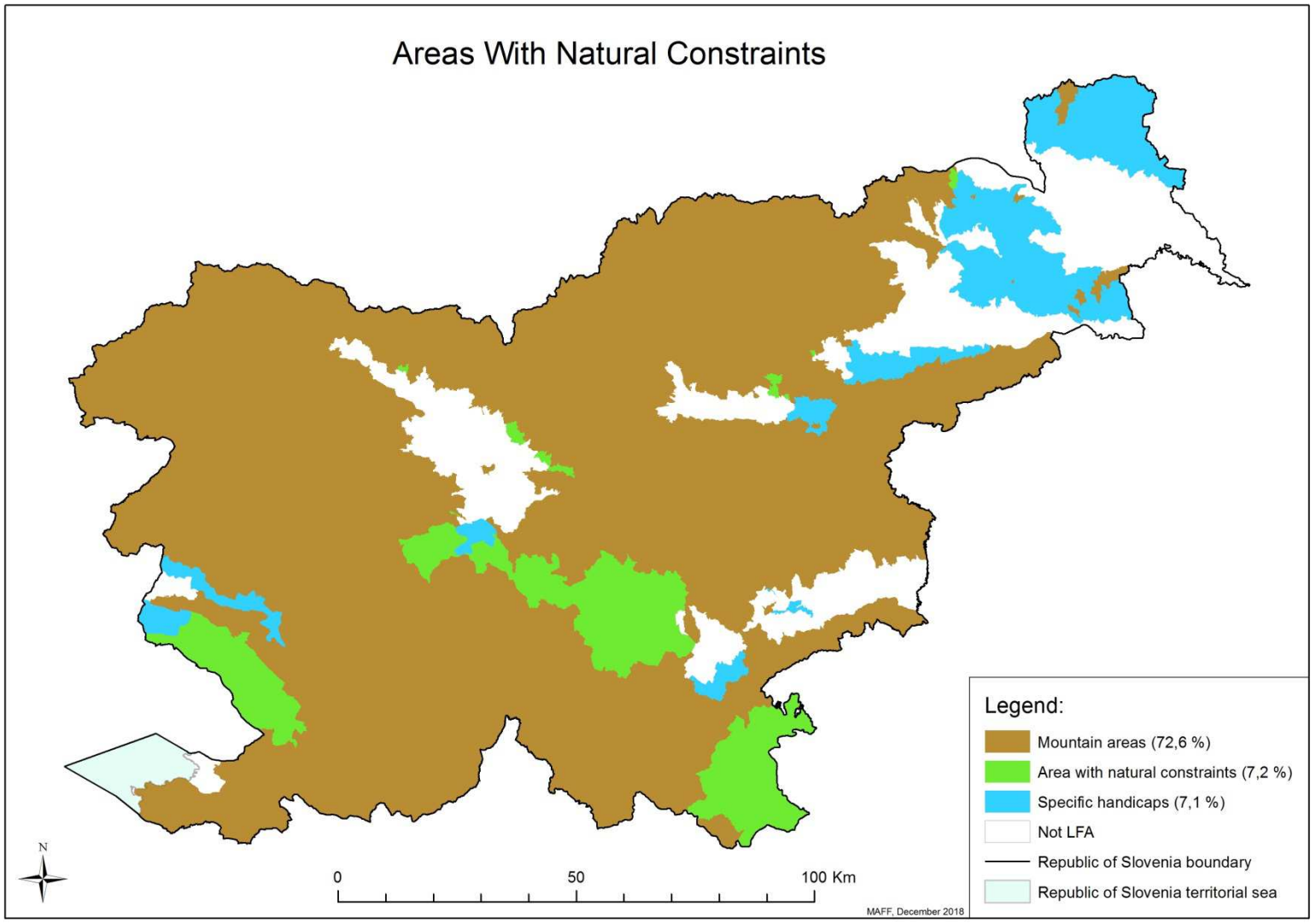


Figure 34: Spatial presentation of Slovenian proposal for ANCs

10. Annex: List of ANC

LAU2_ID	LAU2_NAME	Total surface (ha)	Not_ANC (ha)	Mountain (ha)	Natural Cons. (ha)	Specific Cons. (ha)
1	Ajdovščina	24523	0	4186	0	2238
2	Beltinci	6225	4101	0	0	0
3	Bled	7229	576	848	0	0
4	Bohinj	33373	0	3340	0	0
5	Borovnica	4232	0	429	762	0
6	Bovec	36732	0	3442	0	0
7	Brda	7197	0	2972	0	0
8	Brezovica	9117	0	781	2373	0
9	Brežice	26806	7018	5756	0	0
10	Tišina	3882	2802	0	0	0
11	Celje	9490	2467	1087	0	2
12	Cerklje na Gorenjskem	7804	2265	941	0	0
13	Cerknica	24095	0	6231	0	0
14	Cerkno	13159	0	3477	0	0
15	Črenšovci	3369	1851	0	0	0
16	Črna na Koroškem	15596	0	1397	0	0
17	Črnomelj	33963	0	436	6667	0
18	Destrnik	3435	1	0	0	2096
19	Divača	14505	0	2476	1055	0
20	Dobrepolje	10315	0	1902	0	0
21	Dobrova-Polhov Gradec	11748	0	3087	52	0
22	Dol pri Ljubljani	3328	814	456	0	0
23	Domžale	7230	2610	486	0	0
24	Dornava	2840	690	0	0	1078
25	Dravograd	10500	0	3113	0	0
26	Duplek	3998	1982	79	0	2
27	Gorenja vas-Poljane	15325	0	4219	0	0
28	Gorišnica	2911	1781	0	0	182
29	Gornja Radgona	7460	802	145	0	3243
30	Gornji Grad	9010	0	1905	0	0
31	Gornji Petrovci	6684	0	0	0	2576
32	Grosuplje	13379	0	1112	3369	0
33	Šalovci	5816	0	0	0	2687
34	Hrastnik	5858	0	1484	0	0
35	Hrpelje-Kozina	19492	0	3696	204	0
36	Idrija	29369	0	5070	0	0
37	Ig	9878	0	849	2644	0
38	Ilirska Bistrica	47998	0	9280	0	0
39	Ivančna Gorica	22701	0	2224	5161	0
40	Izola	2856	0	1254	0	0
41	Jesenice	7584	0	1201	0	0

42	Juršinci	3626	0	16	0	2141
43	Kamnik	26564	0	5422	466	0
44	Kanal	14653	0	1853	0	0
45	Kidričevo	7150	4581	0	0	4
46	Kobarid	19273	0	4259	0	0
47	Kobilje	1974	0	0	0	831
48	Kočevje	55537	0	6393	3	0
49	Komen	10272	0	256	2683	0
50	Koper	30332	1664	7506	0	0
51	Kozje	8969	0	3416	0	0
52	Kranj	15091	3589	1146	0	0
53	Kranjska Gora	25631	0	1891	0	0
54	Krško	28654	5891	6580	0	0
55	Kungota	4899	1	2546	0	0
56	Kuzma	2285	0	392	0	525
57	Laško	19746	0	6359	0	0
58	Lenart	6210	1292	0	0	2378
59	Lendava	12102	6746	0	0	0
60	Litija	22138	0	5309	0	0
61	Ljubljana	27499	3842	2034	0	2021
62	Ljubno	7891	0	1512	0	0
63	Ljutomer	10723	3562	810	0	2175
64	Logatec	17302	0	3878	0	0
65	Loška dolina	16680	0	2242	0	0
66	Loški Potok	13446	0	1898	0	0
67	Luče	10945	0	1339	0	0
68	Lukovica	7490	0	1893	381	0
69	Majšperk	7278	3	1318	0	1311
70	Maribor	14747	1450	3276	0	0
71	Medvode	7759	1250	730	0	0
72	Mengeš	2246	957	39	0	0
73	Metlika	10872	0	279	3666	0
74	Mežica	2645	0	598	0	0
75	Miren-Kostanjevica	6278	354	27	0	952
76	Mislinja	11217	0	2370	0	0
77	Moravče	6138	0	1950	447	0
78	Moravske Toplice	14446	3892	0	0	3845
79	Mozirje	5356	0	1535	0	0
80	Murska Sobota	6443	4161	0	0	0
81	Muta	3877	0	1214	0	0
82	Naklo	2829	846	9	0	0
83	Nazarje	4340	0	903	0	0
84	Nova Gorica	27949	212	4576	0	1159
85	Novo mesto	23585	1983	3774	0	1145
86	Odranci	693	523	0	0	0

87	Ormož	14159	2332	701	0	5432
88	Osilnica	3622	0	259	0	0
89	Pesnica	7584	2232	2787	0	0
90	Piran	4345	14	1621	0	0
91	Pivka	22325	0	5230	0	0
92	Podčetrtek	6065	0	3102	0	0
93	Podvelka	10388	0	1505	0	0
94	Postojna	26987	0	6851	0	0
95	Preddvor	8696	3	1252	0	0
96	Ptuj	6666	2039	0	0	1460
97	Puconci	10766	2582	0	0	3277
98	Rače-Fram	5124	1885	862	0	0
99	Radeče	5197	0	1342	0	0
100	Radenci	3412	939	0	0	1021
101	Radlje ob Dravi	9393	0	2256	0	0
102	Radovljica	11871	1655	1467	0	0
103	Ravne na Koroškem	6345	0	1737	0	0
104	Ribnica	15364	0	3451	0	0
105	Rogašovci	4015	0	0	0	2485
106	Rogaška Slatina	7148	0	3244	0	0
107	Rogatec	3953	0	1105	0	0
108	Ruše	6081	0	620	0	0
109	Semič	14666	0	1255	1158	0
110	Sevnica	27217	0	8669	0	0
111	Sežana	21740	0	744	5113	0
112	Slovenj Gradec	17369	0	5080	0	0
113	Slovenska Bistrica	26006	4321	3601	0	1597
114	Slovenske Konjice	9786	1714	1766	0	923
115	Starše	3397	1952	0	0	0
116	Sveti Jurij ob Ščavnici	5132	1265	0	0	1631
117	Šenčur	4028	1839	1	0	0
118	Šentilj	6501	0	2636	311	1
119	Šentjernej	9596	3023	901	0	459
120	Šentjur	22225	1	7537	0	2350
121	Škocjan	6045	1059	1623	0	135
122	Škofja Loka	14601	1247	2405	0	0
123	Škofljica	4329	0	789	1035	0
124	Šmarje pri Jelšah	10765	0	5628	0	1
125	Šmartno ob Paki	1815	247	509	0	0
126	Šoštanj	9559	0	2478	0	0
127	Štore	2815	0	918	0	1
128	Tolmin	38233	0	6039	0	0
129	Trbovlje	5816	0	1270	0	0
130	Trebnje	16332	0	1096	5058	0
131	Tržič	15537	0	2239	154	0

132	Turnišče	2384	1710	0	0	0
133	Velenje	8350	0	2710	0	0
134	Velike Lašče	10318	0	2417	0	0
135	Videm	7997	1485	1962	0	602
136	Vipava	10741	0	1549	0	1375
137	Vitanje	5938	0	1672	0	0
138	Vodice	3138	1307	0	0	0
139	Vojnik	7527	0	2426	531	0
140	Vrhnika	11564	0	1375	2295	0
141	Vuzenica	5010	0	1087	0	0
142	Zagorje ob Savi	14714	0	4223	0	0
143	Zavrč	1930	0	882	0	0
144	Zreče	6704	0	1915	67	0
146	Železniki	16379	0	2395	0	0
147	Žiri	4922	0	1489	0	0
148	Benedikt	2414	0	0	0	1491
149	Bistrica ob Sotli	3117	0	1581	0	0
150	Bloke	7507	0	2978	0	0
151	Braslovče	5498	2116	492	0	0
152	Cankova	3058	1054	0	0	890
153	Cerkvenjak	2453	0	0	0	1415
154	Dobje	1749	0	1007	0	0
155	Dobrna	3166	0	1059	0	0
156	Dobrovnik	3112	1790	0	0	0
157	Dolenjske Toplice	11021	114	809	0	247
158	Grad	3739	0	366	0	1385
159	Hajdina	2182	1456	0	0	0
160	Hoče-Slivnica	5371	1292	761	0	0
161	Hodoš	1812	0	0	0	719
162	Horjul	3255	0	1174	0	0
163	Jezersko	6881	0	417	0	0
164	Komenda	2406	1132	0	0	0
165	Kostel	5616	0	582	0	0
166	Križevci	4625	3020	0	0	37
167	Lovrenc na Pohorju	8443	0	911	0	0
168	Markovci	2984	1856	0	0	0
169	Miklavž na Dravskem polju	1254	663	0	0	0
170	Mirna Peč	4804	890	826	0	0
171	Oplotnica	3315	619	896	0	0
172	Podlehnik	4602	0	1496	0	1
173	Polzela	3401	536	915	0	0
174	Prebold	4065	623	518	0	0
175	Prevalje	5807	0	1780	0	0
176	Razkrižje	985	491	69	0	0
177	Ribnica na Pohorju	5932	0	721	0	0

178	Selnica ob Dravi	6447	0	1396	0	0	
179	Sodražica	4948	0	1123	0	0	
180	Solčava	10275	0	676	0	0	
181	Sveta Ana	3716	0	38	0	2133	
182	Sveti Andraž v Slov. goricah	1760	1	0	0	1190	
183	Šempeter-Vrtojba	1495	563	0	0	0	
184	Tabor	3469	435	633	0	0	
185	Trnovska vas	2289	1	0	0	1537	
186	Trzin	862	284	0	0	0	
187	Velika Polana	1867	814	0	0	0	
188	Veržej	1202	735	0	0	0	
189	Vransko	5334	178	1251	0	0	
190	Žalec	11709	2885	2186	0	0	
191	Žetale	3811	0	1283	0	0	
192	Žirovnica	4258	0	1002	0	0	
193	Žužemberk	16434	0	0	3685	0	
194	Šmartno pri Litiji	9489	0	2445	0	0	
195	Apače	5350	3338	35	0	74	
196	Cirkulane	3207	0	1478	0	0	
197	Kostanjevica na Krki	5831	618	879	0	73	
198	Makole	3694	0	593	0	724	
199	Mokronog-Trebelno	7339	0	2436	0	0	
200	Poljčane	3750	0	402	0	766	
201	Renče-Vogrsko	2947	662	360	0	1	
202	Središče ob Dravi	3279	1357	0	0	402	
203	Straža	2853	937	35	0	0	
204	Sveta Trojica v Slovenskih goricah	2591	879	0	0	763	
205	Sveti Tomaž	3809	0	0	0	2235	
206	Šmarješke Toplice	3423	837	892	0	0	
207	Gorje	11622	0	1051	0	0	
208	Log-Dragomer	1107	0	0	473	0	
209	Rečica ob Savinji	3008	0	977	0	0	
210	Sveti Jurij v Slovenskih goricah	3071	1	137	0	1860	
211	Šentrupert	4908	0	1889	0	0	
212	Mirna	3131	0	967	80	0	
213	Ankaran	805	280	0	0	0	
	SUM	2027088	143867	337109	49893	73284	604153

Table 26: List of municipalities in Slovenia and classification of agricultural land in ANC. Due to rounding the value to the administrative unit (LAU2), the sum of the surfaces can be deviated from the sum of the surfaces in Table 26.

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