



# Mineral Deposits of Public Importance (MDoPI) in Slovenia

## Nahajališča mineralnih surovin javnega pomena v Sloveniji

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### Abstract

The second pillar of the “Raw materials initiative – meeting our critical needs for growth and jobs in Europe” praises the intention of safeguarding mineral deposits from sterilisation. In the near future, each Member State may protect access to mineral deposits of public importance (MDoPI) in accordance with its national legislation framework. Every Member State should identify its own mineral deposits of public importance to be incorporated into spatial plans. A list of suggested MDoPIs has been created for Slovenia in terms of safeguarding the access to deposits and sustainable mineral supply in the future. The survey of potential MDoPIs is described, and a map of suggested mineral areas is created. 30 areas/deposits have been selected and designated on the national level. On the local/regional level, up to 50 extraction sites were suggested as aggregates supply centres (quarries of crushed stones and gravel pits). Less than 0.5 % of the national territory might be dedicated to future mineral safeguarding. This paper presents the proposed list of potential safeguarded areas of MDoPIs in Slovenia and the MDoPIs map. The list is not closed or finally accomplished, but it is a dynamic system. It will be adopted referring to new geological research results as well as social needs. Nineteen countries are participating in the MINATURA2020 project (Horizon2020 program), and seven of them were selected as case studies (United Kingdom, Italy, Sweden, Portugal, Hungary, Poland, and Slovenia) regarding the differences in the territorial size, types of mineral endowment, and national mineral policies. The project provides an opportunity to engage with the issue and begin the safeguarding process on the national level.

### Izvleček

Namera Evropske unije v srednjeročnem obdobju je zavarovati svoja nahajališča mineralnih surovin v skladu z drugim stebrom »Pobude za surovine – zagotavljanje preskrbe z nujno potrebnimi surovinami za rast in delovna mesta v Evropi«. Vsaka država članica bo v prihodnje v skladu s svojo državno zakonodajo zavarovala dostop do nahajališč mineralnih surovin javnega pomena (ang. mineral deposits of public importance - MDoPI). Zato je naloga nacionalnih geoloških zavodov, da strokovno določijo nahajališča mineralnih surovin, ki naj bodo v prihodnje ustrezno opredeljena v prostorskih načrtih in varovana pred poselitvijo. V ta namen smo pripravili nabor slovenskih nahajališč, ki bi jih bilo v prihodnje smotrno varovati za zagotavljanje trajnostne oskrbe z mineralnimi surovinami. V raziskavi smo predlagana nahajališča opredelili, opisali in utemeljili. Na državni ravni smo izbrali 30 nahajališč nekovinskih mineralnih surovin javnega pomena in na regionalni ravni približno 50 centrov preskrbe s kamenimi agregati (tehnični kamen, prod in pesek). Skupna površina ozemlja, ki naj bi se v prihodnosti zavarovala, je glede na predlagan nabor nahajališč, manjša od 0,5 % državnega ozemlja. V prispevku je predstavljen predlog nabora nahajališč s karto predlaganih nahajališč mineralnih surovin javnega pomena. Predlog nahajališč ni dokončen, temveč je dinamičen in se bo, glede na nove rezultate geoloških raziskav in potrebe družbe, skozi čas dopolnjeval. V projektu MINATURA2020 (program Obzorje 2020) sodeluje 19 držav. Sedem držav je bilo izbranih kot testna območja (Velika Britanija, Italija, Švedska, Portugalska, Madžarska, Poljska in Slovenija) glede na različne velikosti državnega ozemlja, raznovrstnost mineralnih surovin ter nacionalno zakonodajo. Projekt ponuja priložnost, da se soočimo s problematiko, in pričnemo s procesom varovanja nahajališč mineralnih surovin na državni ravni.

## Introduction

In recent decades, the importance of minerals has increased: prices have risen, as has mineral consumption, due to the increased needs/demands of new growing economies in China, Brazil, etc. (SHIELDS & ŠOLAR, 2004; ŠOLAR, 2015). Insufficient production within the EU and increases of imported raw materials from other parts of the world are reflected in supply shortages. Different land uses, e.g. nature preservation, infrastructure building, water protection, etc., are sharing preferential treatment, while mineral deposits (MD) are often neglected in land-use planning. In general, the consumption of minerals is increasing, and available areas for potential mineral extraction are running short; therefore, continuous reduction of available land for exploration and mineral extraction became a risk.

In November 2008, the European Commission (EC) launched the “Raw materials initiative – meeting our critical needs for growth and jobs in Europe” (RMI) which established an integrated strategy to respond to the different challenges related to access to non-energy and non-agricultural raw materials. The RMI is based on three pillars: (1) *Ensuring the fair and sustainable supply of raw materials from international markets, promoting international cooperation with developed and developing countries*; (2) *Fostering sustainable supply of raw materials from European sources*; and (3) *Reducing consumption of primary raw materials by increasing resource efficiency and promoting recycling* (EUROPEAN COMMISSION, 2008). By identifying mineral deposits of public importance and securing their access, we are also supporting the first pillar.

The Raw materials initiative (EUROPEAN COMMISSION, 2008) and the European Innovation Partnership’s (EIP) Strategic Implementation Plan (SIP) (INTERNET 1; INTERNET 2) highlight access to mineral deposits as a common EU challenge that also targets Member States. Therefore, national Geo-Surveys endeavours to designate mineral deposits of public importance (MDoPI) reflect the above-mentioned initiatives’ aims. Geo-Surveys experts’ work and activities contribute to better communication between the mineral sector and the land use planning sector. Current land use planning fails to address mineral potential areas and temporary land use for mineral extraction is neglected as well (e.g. surface extraction of clays) (EUROPEAN COMMISSION, 2000). Constructive dialogue amongst different land users and planners should be straightened.

Recent EU statistics show that every newborn infant will need a lifetime supply of 300 kg of lead, 280 kg of zinc, 560 kg of copper, 1,350 kg of aluminium, 12,200 kg of iron, 9,950 kg of clays, 1,500 kg of salt and 448,000 kg of stone, sand, gravel, and cement (INTERNET 3). Therefore, the exploitation of minerals in Europe is an indispensable activity and must ensure that the present and future needs of the European society can be met. This requires sufficient access to mineral deposits (UNIVERSITY OF LEOBEN, 2004). Prospective mineral deposits (taking into account abandoned mines and historical mining sites) should be considered with respect to and in balance with other land uses, such as agriculture, forestry, natural preservation, building, and infrastructure. Furthermore, the access to mineral deposits also needs to meet public demands.

The importance of the minerals supply for the benefit of society and the necessity to develop planning policies that respect the highest environmental and social criteria of sustainability should be recognised. Some deposits of metals, industrial minerals and construction materials (energy minerals are mostly treated properly all over Europe) should be considered of “public importance”. This is where information demonstrates that sustainable exploitation could provide economic, social, or other benefits to the EU or the Member States or a specific region/municipality (MINATURA2020 PROJECT CONSORTIUM, 2014).

Parallel with geological definitions, a harmonised European regulatory framework for sustainable access and mineral supply should be developed. It will include the “sustainability principle” for exploration and mineral extraction (SHIELDS & ŠOLAR, 2004; ŠOLAR, 2015). The concept of mineral safeguarding should be incorporated.

Geo-Surveys’ task is to identify, explore and properly designate MDoPIs on the national and local level that should be safeguarded by incorporation into spatial plans. Therefore, the establishment and maintenance of INSPIRE compliant geo-referenced Mineral Information System is a vital task of every national Geo-Survey.

Slovenia belongs to the group of the countries which apply a safeguarding regulative concept while mineral deposits are included into land use plans only through a permit process. This means that only areas with mining rights are safeguard-

ed. There is no open door for “potential deposits” that still have not been granted mining rights. According to the Slovenian Mining Act (OFFICIAL GAZETTE RS, 2014), only energy raw materials can be of strategic importance. Currently, Slovenia is preparing a new National Mining Strategy, which is an excellent opportunity to improve the current mineral status in terms of safeguarding minerals and their deposits on the national level.

### Materials and methods

Despite its relatively small national territory, Slovenia has numerous mineral deposits. More than 200 extraction sites (almost all of them are open pits and quarries) with mining rights (under concessions) are currently active, with 26 different mineral resources (construction materials, industrial minerals, and energy resources). Slovenia also has around 200 sites of metallic mineral deposits, and occurrences and a few dozen are closed or abandoned mines operations. Today, all metal mines are closed after a long mining period, but there are still ore reserves which could be exploited in the future. Nowadays, extraction of mineral resources in Slovenia is focused on construction, for the industry of building materials, and a few industrial minerals. Annual production of construction materials and industrial minerals is around 15 million tons (aggregates, dimension stone, clays, quartz sand, etc.) not taking into account energy minerals (lignite and hydrocarbon production). Estimation of reserves and resources within mining areas is around 840 million tons. Non-metal mineral resources are used in the construction, ceramic, brick, metallurgy and metalworking industries, for the environment and water purification, glass manufacturing, farming, food industry, etc. (SENEGAČNIK et al., 2016; SENEGAČNIK & ŠTIH, 2016). Mining activities in Slovenia are under the jurisdiction of the Ministry of Infrastructure, precisely under its mining sector.

Natura 2000 (OFFICIAL GAZETTE RS, 2004b) covers more than 37 % of national territory, not including 12.6 % of protected areas (1 national park, 3 regional parks, 45 landscape parks, 1 strict nature reserve and 54 nature reserves, and 1,163 natural monuments) in Slovenia (INTERNET 4-7). In Slovenian practice, few natural resources are properly safeguarded (e.g. water, forests and agricultural land), while mineral resources, although non-renewable, are rather neglected. Therefore, an adequate regulatory or guidance framework similar to Natura 2000 should be es-

tablished in order to equally protect mineral resources as, for example, Natura 2000 sites across the EU.

Slovenians' shallow geological structures are relatively well-known. Based on extended knowledge on lithological composition and on mineral deposits, the Geological Survey of Slovenia (GeoZS) has established a Mineral Information System on the national level. The Geo-Surveys across the EU also identify their MDoPIs. In Slovenia, industrial minerals and construction minerals/aggregates have been put on the list at this stage. The geological knowledge of deep structures is not sufficient due to lack of deep exploration. There is a possibility of raw material potential in deeper structures. Even some abandoned and closed metal mines could be important in the future.

For the designation of MDoPIs, two different levels were taken into account: the national and local/regional levels. On the national level, a few industrial mineral deposits are selected and on the local/regional level some aggregates supply centres are suggested.

Slovenia is endowed with aggregates (crushed stone, sand and gravel) regarding its geological settings; however, there are many overlapping land use interests and protected areas (Natura 2000, water protection areas, etc.). Therefore, it is very important to define and place locations for aggregate extraction. Due to bulk production, negative environmental impacts also occur. These locations are most delicate to manage, and they are barely incorporated into spatial plans. Therefore, locations should be selected according to their environmental and nature protection requirements, also taking into account other land uses.

### Detailed methodology description

Slovenia currently extracts/produces non-metals and energy resources. Since energy resources might be of strategic importance and therefore properly treated, our survey was focused on non-energy minerals (industrial minerals and aggregates). Slovenian MDoPIs were selected due to their uniqueness, rareness, and importance for existing industry or traditional housing use as construction material. Detailed methodology is presented for three cases for MDoPIs selection:

*Case a) Dimension stone - limestone in Slovenian Karstic region (Table 1, No. 14-16):*

Cretaceous limestone (Fig. 1a) as an autochthonous building material has played a crucial role in the Adriatic area. Massive and platy limestone, are both recognizable elements of the cultural landscape along the Adriatic karstic coast (VESEL, 1980; JURKOVŠEK et al., 2013; NOVAK, 2015). Blocks of limestone have been used for housing and as an ornamental stone, platy limestone also as roof tiling, for the construction of dry walls, shepherd cottages, and similar structures. Besides being an element of cultural heritage, it is also important for natural heritage, with often rich and diverse fossil fauna e.g. well-preserved vertebrate fossils. For centuries excavated in regional quarries, few of them are also located in backyards or in small delves near villages. The white limestone blocks with specific polished surfaces were also used in the neighbour trans-border area (e.g. in Italy) as a globally known building (dimension) stone.

*Case b) Ilirska Bistrica clay deposit in Southwest region (Table 1, No. 1):*

The largest clay deposit in Slovenia is developed on Eocene flysch of Reka synclinal (Fig. 1b). The thickest layer of Plio-Pleistocene clay in Slovenia, situated in 3 km long synclinal, was explored by drilling. This, over 60 m thick, layer consists rather of homogenous clay that had been used as brick and ball clay (JERŠE et al., 1986; JERŠE, 1990; ROKAVEC, 2014). The mineral composition is muscovite-illite-montmorillonite, with particle size 25-53 % of clay particles under 2 µm. In the 20<sup>th</sup> century, the region was producing brick; nowadays, no industry uses clay, and the huge resources and reserves remain intact, although Slovenia imports this type of clay.

*Case c) Chert in Mirna Valley in Central – South Slovenia (Table 1, No. 22):*

Chert outcrops occur in the Mirna Valley (locations Jersovec, Ogorelke, and Gabrovka) as well as in several smaller deposits (Fig. 1c). The Mirna chert deposit is unique in the country (ŠOLAR, 1994; SKABERNE, 2003). Primary chert occurs in Triassic limestones and dolomites, and secondary chert, which is product of weathering processes, occurs in breccias with a clay matrix. The entire production of chert is being exported. This mineral commodity of good quality is used for production of refractories materials.

The source of data and information for this survey were the following references:

- the Mining registry book (MZI, 2015, 2017),
- periodical bulletin “Mineralne surovine” (SENEGAČNIK et al., 2016),
- “Bulletin Mineral resources in Slovenia” (SENEGAČNIK & ŠTIH, 2016),
- papers and monographies (DIMKOVSKI & ROKAVEC, 2001; BAVEC et al., 2009; JURKOVŠEK et al., 2013; ROKAVEC, 2014; MILETIĆ & ROKAVEC, 2015; RMAN & NOVAK, 2016; ROKAVEC & MILETIĆ, 2016; ROKAVEC & MEZGA, 2017),
- expert reports (JERŠE et al., 1986; ŠOLAR, 1994; SKABERNE, 2003; PLENIČAR et al., 2009; NOVAK, 2015), and other.

## Results and discussion

A list of proposed MDoPIs has been created for Slovenia (Table 1 and 2) along with a MDoPI map (Figs. 2-4) for safeguarding the access to deposits and mineral sustainable supply in the future. On the national level non-metal deposits were designated due to their uniqueness, rareness and importance for existing industry or tra-

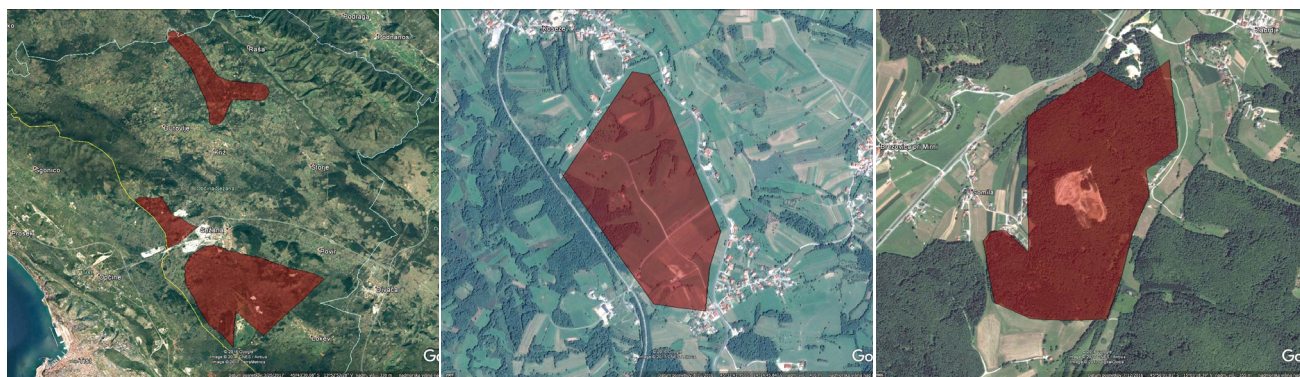


Fig. 1. Examples of three suggested MDoPIs: (a) dimension stone – limestone deposit in Karst, (b) clay deposit in Ilirska Bistrica and (c) chert in Mirna Valley, presented on the GOOGLE EARTH (2017).

ditional housing use as construction material. On the local/regional level aggregates supply centres are suggested, optimally 1-5 locations per every statistical region. Those locations will serve as regional centres for aggregates supply. National

spatial planning strategy (OFFICIAL GAZETTE RS, 2004a) and National mineral resource management programme (GeoZS, 2009) recommend a few bigger regional supply centres instead of numerous small ones.

Table 1. List of potential areas of mineral deposits.

#	Suggested areas of MD (province)	MDoPI	Age	Estimated surface of MDoPI (km <sup>2</sup> )	Type of minerals (mineral commodity)	Arguments for MDoPI selection	Existing protected areas*
1	Ilirska Bistrica	Koseze	Pl	0.53	clays (brick and ball clay)	base for existing and future brick and roof tile industry	N2000, EIA
2	Vipavska dolina / Valley	Okroglica	Ps	1.23			N2000, EIA
3		Renče	Ps	0.06			
4		Dolgi hrib	Ps	0.11			
5		Tomaški hrib	Ps	0.07			
6		Savinjska dolina / Valley	Ljubečna	Pl-Q			
7	Hom		1.01	/			
8	Pomurje area	Boreci	Ps	0.43			N2000, EIA, VNF, WPA (mun.)
9	Podravje area	Hardeška šuma	Ps	1.55			/
10	Jezerko	Jezerko	Pl-Q	0.005	dimension stone- travertine	unique	N2000, EIA, VNF (travertine)
11	Pohorje	Cezlak	Tc	0.24	dimension stone- tonalite and cizlakite	unique	N2000, EIA, VNF
12	Southern Pohorje	Vitanje surrounding	Tc	6.73	ornamental stone - schist gneiss	unique, for traditional buildings	N2000, WPA (mun.), EIA, VNF
13	Hotavlje	Hotavlje	T	0.20	dimension stone- limestone	unique	/
14	Kras	Lipica	K	19.50	dimension stone- limestone	used in natural heritage buildings in karstic area	N2000, EIA, VNF
15		Debela Griža					
16		Doline	K	2.99			N2000, EIA
16		Tomaj	K	6.96			N2000, EIA, VNF, WPA (mun.)
		Kazlje					
16	Kopriva						
17	Primorska region	Milje	Ec	0.14	dimension stone - flysch sandstone	typical for region	/
18	Globoko and Bizeljsko Region	Globoko and Bizeljsko Hills	Pl	19.10	quartz sand, clay	rare	N2000, EIA, VNF
19	North-Eastern Slovenia	Puconci surrounding	Pl, Ps	1.83	quartz sand	rare	N2000, EIA, VNF, LP
20	Dolenjska Region	Raka-Ravno	Pl	0.98			N2000, EIA, VNF
21	Moravče synclinal	Moravče	Mc	10.3			N2000, EIA, VNF, WPA (mun.)
22	Mirna Valley	Jersovec and other	T3	0.75	chert	unique	VNF
23	Northern Soča Valley	Srpenica	Ps	0.15	chalk	unique	N2000, EIA, VNF
24	Stahovica	Stahovica	T3	0.84	calcite	rare	N2000, EIA, VNF (calcite), WPA (mun.)
25	Zaloška Gorica	Zaloška Gorica	Ol	0.94	bentonite, tuff	unique	/
26	Solkan	Solkan	K	0.36	limestone for cement industry	supports existing lime and cement industry	/
27	Kresnice	Kresnice	T	1.65	limestone for lime industry	supports existing lime and cement industry	WPA (mun.)
28	Anhovo	Anhovo deposits	Pc	2.72	raw material for cement industry	supports existing lime and cement industry	VNF
29	Sečovelje	Sečovelje saltworks	rec.	6.39	sea salt	traditional salt-works, natural heritage	N2000, EIA, VNF (halite), LP
30	Strunjan	Strunjan saltworks	rec.	0.19			N2000, EIA, VNF (halite), LP

MD – mineral deposit; \*N2000 = Natura 2000, EIA = Ecologically important area, VNF = Valuable natural features, LP = Landscape park, WPA = Water protection area, nat. = national level, mun. = municipal level; rec. – recent.

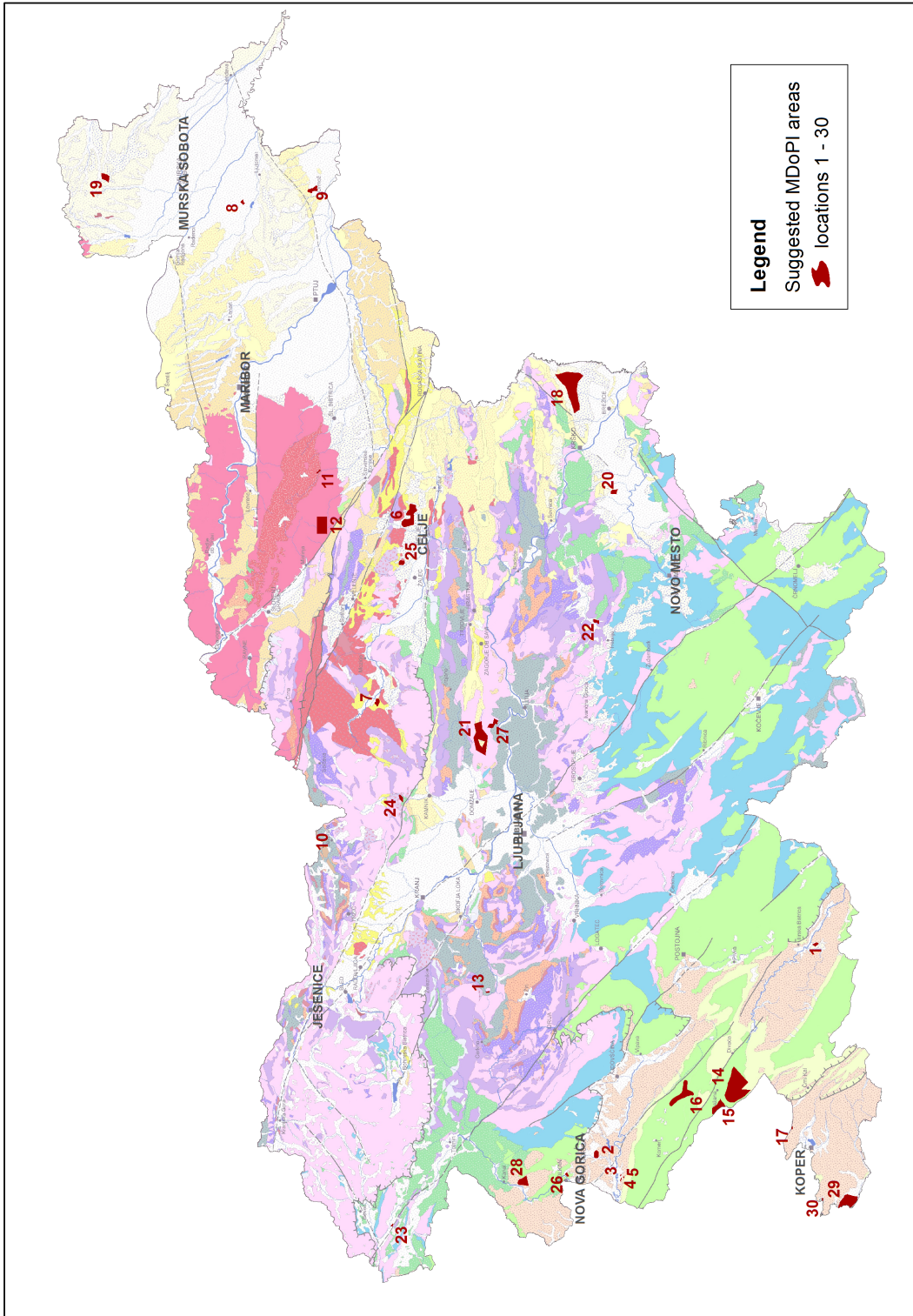


Fig. 2. Suggested MDoPI areas in Slovenia presented on the Geological Map of Slovenia 1:1.000.000 (Bavec et al., 2013).

## (a) National level (non-metals /industrial minerals)

On the national level 30 areas of non-metal deposits were designated, mainly clays, dimension stone, quartz sand, chert, chalk, calcite, bentonite, limestone for industrial purpose and others (Table 1, Fig. 2). Due to geological settings, these deposits should be treated as safeguarding priority in land use plans.

The total surface of suggested MDoPI areas in Slovenia is ca. 95 km<sup>2</sup>, which is approximately 0.47 % of state territory, not including aggregates, which also need to be safeguarded. The suggested MDoPIs are mostly located outside urbanised areas, often close to the extraction areas where detailed research has been conducted in response to industry demands.

The designation of MDoPIs has been a specific issue in our work due to various geological compositions, different mineral deposits characteristics and their extension. Two different principles were used for MDoPI designation:

- a. The entire geological formation was recognised as a unified MDoPI area (e.g. Karst region) as a carbonaceous (limestone) platform which has an applicable value as an autochthonous building material. The entire designated area is not meant to be safeguarded, but only the access to particular deposits should be secured.

- b. Small mineral sites (occurring locally) were recognised due to their limited reserves (e.g. Mirna chert deposits).

## (b) Local/regional level (aggregates)

On the local/regional level, one to five locations – aggregate supply centres per statistical region were considered. Up to 50 extraction localities for local/regional aggregates supplies are suggested (Fig. 4, Table 2).

MDoPIs on the national level are displayed as polygons (marked in red, Fig. 4) and aggregates supply centres on the regional level are displayed as points (marked in yellow, Fig. 4) in the ArcGIS (ESRI, 2014). The shape file was transferred to an interactive map on Google Earth application (GOOGLE EARTH, 2017) for an overview of the locations and areas of potential MDoPIs.

The proposed list of MDoPIs and the borders of suggested mineral deposits are not final; the list is a dynamic system that should be adopted referring to new geological research results, as well as knowledge and social demands in the future. The proposed MDoPIs are overlapping mostly forest, agricultural or built-up areas (regarding their land use). In a few cases, they also extend into protected areas (e.g. Natura 2000, ecologically important areas, valuable natural features, landscape parks, etc.). Re-

Table 2. Suggested regional supply centres with aggregates.

No.	Region	Production in the region (tons/year)*	Number of appropriate location	Mineral resource (aggregates)
1.	Central-Slovenian region	2 236 722	5	crushed stone – limestone crushed stone – dolomite sand and gravel
2.	Coastal-Karstic region	1 612 710	3	crushed stone – limestone
3.	Drava region	1 868 529	4	sand and gravel
4.	Gorenjska region	794 148	3	sand and gravel crushed stone – dolomite and silicates (quartz keratophyre)
5.	Goriška region	157 974	1	crushed stone – limestone
6.	Koroška region	206 072	2	crushed stone – dolomite sand and gravel
7.	Notranjsko-karstic region	254 539	2	crushed stone – dolomite crushed stone – limestone
8.	Pomurje region	1 129 366	4	sand and gravel crushed stone – silicates
9.	Savinja region	1 386 377	3	crushed stone – limestone crushed stone – dolomite
10.	Southeastern Slovenia (including Bela Krajina, Kočevska and Dolenjska region)	527 675	4	crushed stone – dolomite
11.	Spodnjeoposavska region	785 482	4	crushed stone – dolomite sand and gravel
12.	Zasavje region	92 388	1	crushed stone – dolomite

\* (SENEGAČNIK et al., 2016)

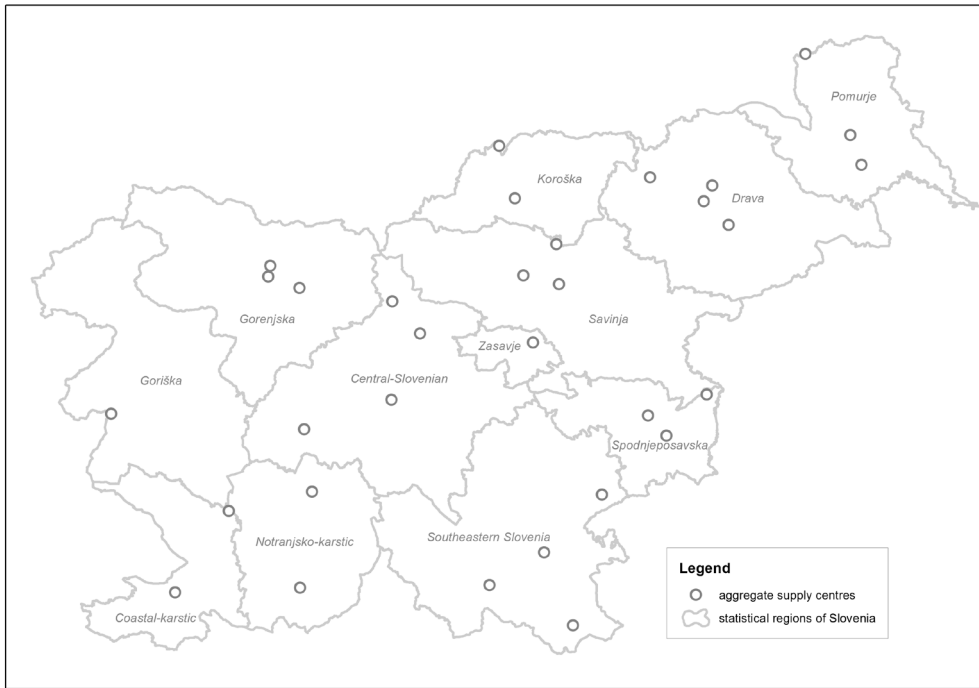


Fig. 3. Future network of aggregate supply centres on the regional level.

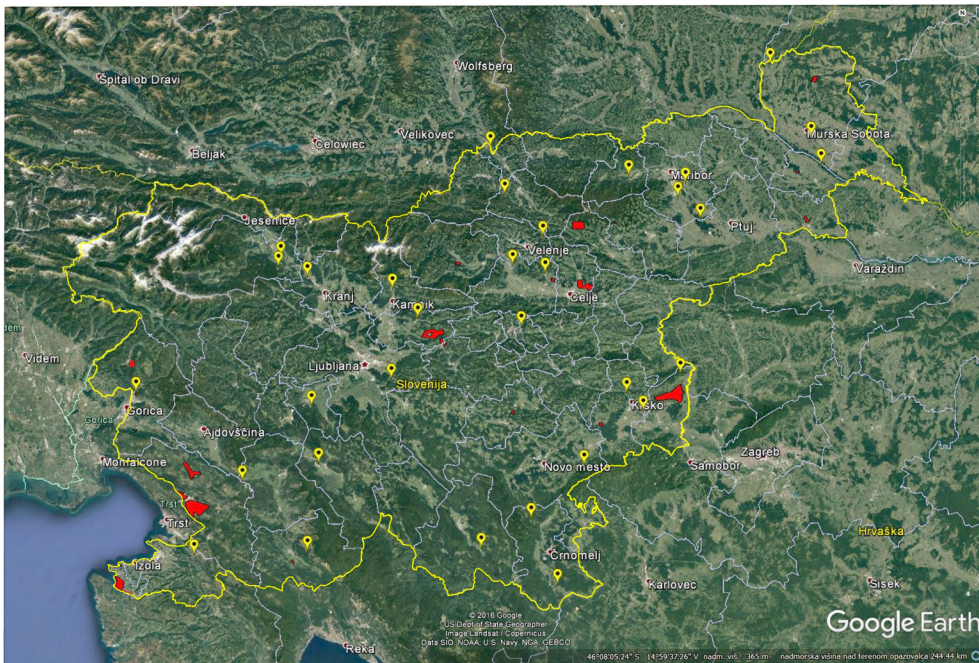


Fig. 4. Suggested MDoPIs in Slovenia displayed in GOOGLE EARTH (2017; marked in red on the national level and marked in yellow on the local/regional level).

regardless of existing land use, the mineral deposits (at least those that are rare and unique) should be designated in spatial plans and, therefore, safeguarded for future generations. Geological settings/mineral deposits cannot be moved to another location, while most human activities can (e.g. industrial structures, agriculture, and housing). Therefore, Natura 2000 (HABITATS DIRECTIVE 92/43/EEC) does not exclude or even prohibit mineral exploration and extraction but sets certain limits (EUROPEAN COMMISSION, 2010).

#### Good practices from other EU countries

Twenty-four partners from 19 countries participate in the project MINATURA2000 – “Developing a concept for a European minerals deposit framework” (MINATURA2020 PROJECT CONSORTIUM, 2014; INTERNET 8). Some of them were selected as case-study countries, i.e. United Kingdom, Italy, Sweden, Slovenia, Portugal, Hungary, and Poland. These countries differ in territorial size, mineral endowment, and national mineral policies and have been surveyed as well in terms of designating their MDoPI (EUROPEAN COMMISSION,



2000). Due to their territorial size only selected areas (e.g. provinces) have been examined in detailed. Metals, industrial minerals, and aggregate deposits have been suggested for future safeguarding regimes on different levels: national, regional, and local, depending on the national mineral policy and ownership of minerals (Table 3) (ROKAVEC et al., 2016a).

#### Italy

- Emilia Romagna Region: 11 deposits of aggregates (alluvial sands and gravels, coastal sands, sandstones and conglomerates, limestones, siliceous rocks).

#### Portugal

- Tungsten province (national level): 38 deposits of metal ores (W, Sn, Pb, Au, Mo, Ag).
- Rio Maior (local level): Mineral deposit of special Quartz kaolinite-rich sands (Special sands).

#### Hungary

- Borsot-Aubauj-Zemplen, Hajdu-Bihar, Heves, Szabolcs-Szatmar-Berek): 402 deposits of non-metals (sand, gravel, crushed stone, clay and perlite).

#### Sweden

- Norrbotten Country: 24 deposits of metal ores (Pb, Ag, Cu, Au, Fe) and non-metals (graphite, dolomite and limestone for industrial purpose, kaolin, magnesite, wollastonite, quartz).

#### United Kingdom

- South West England & South Wales: 40 deposits on shore (sand and gravel, crushed stone, dimension stones, ball clay, pottery clay, china clay, brick clay, slates, metals), 10 deposits offshore in Celtic and Irish seas (sand and gravel, undersea salt and potash, metals in seabed nodules, crust and extinct smokers).

#### Poland

- Dolnośląskie Province: 142 deposits with indicated and measured resources (copper-silver ore, nickel ore, barite and fluorite, bentonite, clays (brick, ceramic and fire clays), dimension stone, crushed stone, feldspar, gypsum and anhydrite, kaolin, magnesite, quartzite, aggregates (sand and gravel), sand for lime, sand for glass production).

#### Raising awareness of the importance of minerals

In order to strengthen the awareness of decision makers of the importance of minerals, EU countries are organising regional and national stakeholder consultations in 2016 and 2017. The aim is to promote the idea of safeguarding mineral deposits, to encourage transparent land use practices and, overall, to exchange experiences and views of different sectors dealing with mineral resources. In Slovenia, the first national stakeholder workshop was organised in February 2016 (ROKAVEC et al., 2016b) and the second one in January 2017 (ROKAVEC et al., 2017), both located in Ljubljana.

Table 3. List of potential safeguarded areas (MDoPI) – summary data by countries (SI-Slovenia, I-Italy, PT-Portugal, H-Hungary, S-Sweden, UK-United Kingdom and PL-Poland).

Country	Province	ΣNo. MDoPI (potential areas)	Level	Type of mineral endowment		
				metals	non-metals	aggregates
SI	entire state territory	30	national		x	
		max 50	local/regional			x
I	Emilia Romagna Region	11	regional			x
PT	Tungsten province	38	national	x		
	Rio Maior	1	local		x	
H	Borsot-Aubauj-Zemplen, Hajdu-Bihar, Heves, Szabolcs-Szatmar-Berek	402	regional		x	x
S	Norrbotten country	24	national	x	x	
UK	South West England & South Wales (on shore)	40	regional	x	x	x
	South West England & South Wales (off-shore in Celtic and Irish seas)	10	regional	x		x
PL	Dolnośląskie Province	142		x	x	x

## Conclusions

Mineral supply is an important condition for economic, social and technological development. Due to Europe's huge mineral consumption, it is highly dependent on the import of some mineral resources. Since the mineral supply is becoming a challenge, European industry has expressed the needs through the "Raw materials initiative". In order to ensure sustainable mineral supplies within the EU, it is of great importance to properly safeguard mineral deposits and foster sustainable mineral supply from European sources.

For the sustainable development of European society, the safeguarding of European mineral deposits is one of the key issues. The access to mineral deposits should be secured in order to encourage, firstly, their exploration and afterward, if viable, also their exploitation. It is important that current mineral extraction does not endanger the supply of future generations. The mineral deposits of public importance should be properly evaluated, taking into account the geological settings and economic viability of exploitation and permitted in accordance with land use and environmental requirements. Urbanisation, nature conservation, and other land use interests often impede the access to potential mineral deposits. Coordinated placement of mining areas with other land uses is challenging in order to avoid conflicts and meet social needs.

Slovenia is preparing the basis for a concept for defining and subsequently protecting mineral deposits of public importance (MDoPI). Different land uses, e.g. nature preservation, infrastructure building, water protection, etc., have preferential treatment, while mineral deposits are often neglected in spatial planning procedures. For this purpose, a list and a map of proposed MDoPIs were established for Slovenia. MDoPIs need to be identified, explored, and properly designated on the national and local levels to facilitate their incorporation into spatial plans. On the national level 30 deposits of non-metals have been designated (e.g. dimension stone, clay, chert, raw materials for cement and lime industry, bentonite, tuff, calcite, and quartz sand) in Slovenia. On the local/regional level, up to 50 extraction sites, optimally one to five locations per every statistical region were suggested as aggregate supply centres (crushed stone, sand and gravel). Less than 0.5 % of national territory is estimated to be under safeguarding regime in the future. The list is not final but dynamic and will be changed according to

new geological research results and knowledge of deep geological structures, the market, land uses and other societal conditions. Furthermore, other EU countries, i.e. the United Kingdom, Italy, Sweden, Portugal, Hungary and Poland, are preparing their lists and methodologies for designation of their MDoPIs that should be safeguarded.

Although energy raw materials are of strategic importance (according to Slovenian Mining Act), there is a need to safeguard non-energy mineral resources as well. Slovenia is in a phase of adopting a new National Mining Strategy, which provides an opportunity to improve the current mineral status in terms of safeguarding mineral deposits on the national level.

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