

Natural stone potential in Finland

The occurrence of rocks suitable as natural stone is controlled by the general regional geological history of target areas (Selonen et al. 2014). Each area has its own geological potential for natural stone deposits. Geological Survey of Finland (GTK) commenced natural stone explorations at the end of 1980's with regional projects. Today, projects of this kind have been executed practically throughout Finland.

Based on our studies on prospecting methods (Selonen et al. 2014) and on data produced in connection with the regional explorations by the GTK (Luodes 2008), a tentative map of potential areas for natural stones in Finland can be presented (Fig. 1). The map shows only coherent geological lithologies with potential, smaller units and individual sites are commented below.

Archaean domain (ca 3500-2500 Ma) in eastern Finland is composed mainly of migmatite-granitoid areas, greenstone belts, and mica gneiss/paragneiss areas (Sorjonen-Ward & Luukkonen 2005). The greenstone belts with soapstone (and serpentinite) occurrences are the most important resource as natural stone within this domain. The Proterozoic ophiolite complexes close to the Archaean domain also include soapstone prospects. The migmatite-granitoid areas inside the domain can have potential for multi-colour natural stones. The cutting Proterozoic diabase dykes are sources for "black granites".

The Proterozoic formations in the area of Finnish Lapland include Central Lapland Granite Complex, greenstone belt, granulite arc complex, mafic layered intrusions, as well as schist belts and granite intrusions (Hanski & Huhma 2005, Iljina & Hanski 2005). Individual prospects can be found in the greenstone belt (massive schists) and in the mafic layered intrusions ("black granites"). The schist belts (marbles and schists) and the Nattanen-type granites in Central Lapland (granites) are the most interesting geological units for natural stones in Lapland.

The Central Finland Granitoid Complex (CFGC) comprises different synkinematic intrusions (1890-

1880 Ma), mostly comprising foliated coarse-grained granites and granodiorites, ranging in composition from gabbros to granites (Nironen 2005). Weakly foliated or undeformed post-kinematic intrusions (1885-1870 Ma) are found around the margins of the CFGC (Nironen 2005). The CFGC has a good potential for natural stone, the post-kinematic intrusions being the most interesting within the complex.

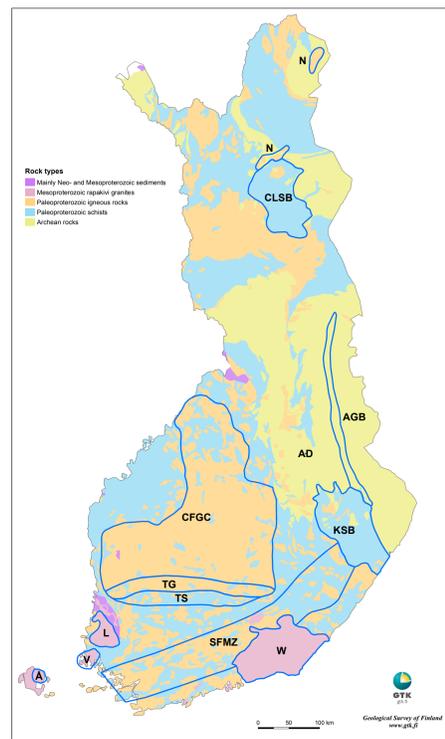


Fig. 1. Geological potential for natural stone in Finland. The map is based on our studies on prospecting methods (Selonen et al. 2014) and on data produced in connection with the regional explorations by the Geological Survey of Finland (GTK) (Luodes 2008). The environmental and infrastructural constraints for exploitation are omitted. See text for further explanation.

AD = Archean domain, AGB = Archean greenstone belts, KSB = Karelian schist belt, CLSB = Central Lapland schist belt, CFGC = Central Finland Granitoid Complex, TS = Tampere Schist Belt, TG = Postkinematic granites in Tampere region, SFMZ = South Finland Migmatite Zone, N = Nattanen-type granites, W = Wiborg rapakivi granite batholith, L = Laitila rapakivi granite batholith, V = Vehmaa rapakivi granite batholith, Å = Åland rapakivi granite batholith.

Geological map © Geologian tutkimuskeskus, Basemaps: © National Land Survey of Finland.

The South Finland Migmatite Zone (SFMZ) is characterized by granite sheets with intense and penetrative subhorizontal regional deformation (Ehlers et al. 1993, Nironen 2005). The structurally gently dipping sheets expose large areas of granite (Ehlers et al. 1993). The SFMZ-zone holds a fair geological potential for natural stone. The zone hosts local high-grade metamorphic, partially melted migmatite areas with good potential for multi-coloured natural stones.

The Proterozoic schist belts to the north of the SFMZ-zone and those around the CFGC (Kähkönen 2005) are intruded mostly as diapiric plutons often composed of several magmatic phases (Nironen 2005). The schist belts hold a moderate geological potential for natural stone, but certain individual intrusions, (green/red/brown), high-grade metamorphic blocks ("multi-colour"), and metasedimentary units (massive schists), can have a good potential.

The anorogenic rapakivi granites (1650-1540 Ma) occur as four major and several smaller batholiths and stocks in southern Finland (Rämö & Haapala 2005). The undeformed rapakivi granites form composite plutons, comprising of smaller intrusions with a variety of different granite types, post-dating regional ductile deformations (e.g. Rämö & Haapala 2005). Hence, the rapakivi batholiths are homogeneous and sparsely fractured and have the highest potential for granitic natural stone in Finland. Approximately 65 % of all granite production in Finland, the largest quarries, and the largest block sizes come from the rapakivi granite areas. Brown, red, and green granite varieties are the most important resources.



Rapakivi granite quarry in winter. Photo: Paavo Härmä

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