

Heritage Stone Subcommittee: An IUGS Subcommittee of the International Commission on Geoheritage

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The International Union of Geological Sciences (IUGS) has a number of commissions and subcommissions, task groups, initiatives, collaborative programs, and flagship activities such as the Deep-Time Digital Earth (DDE) Programme; International Lithosphere Programme (ILP; <https://www.iugs.org/ilp>); International Geoscience Partnership (IGCP; <https://www.iugs.org/igcp>); and International Commission on Geoheritage (ICG; <https://www.iugs.org/commissions>), to name a few. Through these, the IUGS achieves its objectives of supporting geoscientific research, disseminating geoscience information and strengthening geological education, boosting geoscience professionalism, addressing human and societal needs, and capacity building (https://www.iugs.org/_files/ugd/f1fc07_eb51eba6b35443d981f10478bf27f931.pdf). The efforts of IUGS to convey geological research and its significance to society have been aided by collaboration with UNESCO-IGCP (<https://www.iugs.org/https://en.unesco.org/international-geoscience-programme>) and other organizations. One of the most significant goals of the IUGS is to provide authoritative geological standards, such as setting precisely the basis of the International Geological Time Scale (a global standard for expressing the history of the Earth), identifying and designating globally significant geosites and heritage stones (a global standard for geoheritage). This editorial is intended to highlight the Heritage Stone Subcommittee's conception, history, and current operations as a subcommittee of the IUGS-International Commission on Geoheritage.

Creation of International Commission on Geoheritage

The International Commission on Geoheritage (ICG), a scientific commission, was adopted by the IUGS Executive Committee at the 35th International Geological Congress in Cape Town, South Africa, in 2016. The ICG at the time was divided into two subcommissions: the Heritage Sites and Collection Subcommittee (HSCS) and the Heritage Stone Subcommittee (HSS), with the common mandate to promote and raise awareness of the concepts and value of heritage sites and collections, as well as heritage stones, among geologists and others (Figure 1; <https://www.iugs.org/commissions>; https://www.iugs.org/_files/ugd/f1fc07_997cb0f6_8e6c49609a5d77cfc9_02e26e.pdf?index=true). Through research, conferences and workshops, scientific meetings, dedicated fieldwork, and focused research articles, special publications, and books, the two sub-commissions have been able to disseminate the Commission's operations individually and jointly (https://www.iugs.org/_files/ugd/f1fc07_997cb0f68e6c49609a5d77cfc902e26e.pdf?index=true).

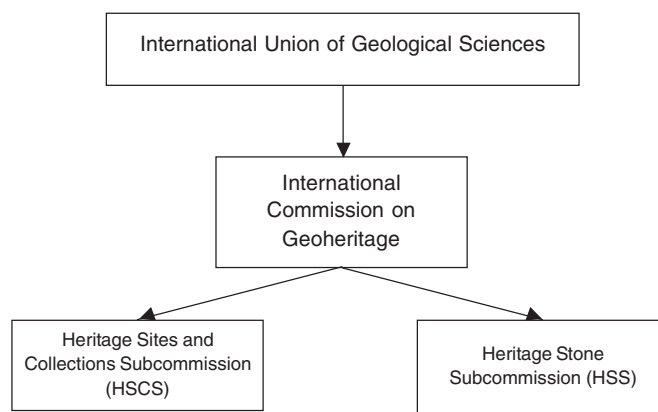


Fig. 1. IUGS - International Commission on Geoheritage with two subcommissions: HSCS and HSS in 2016-2022.

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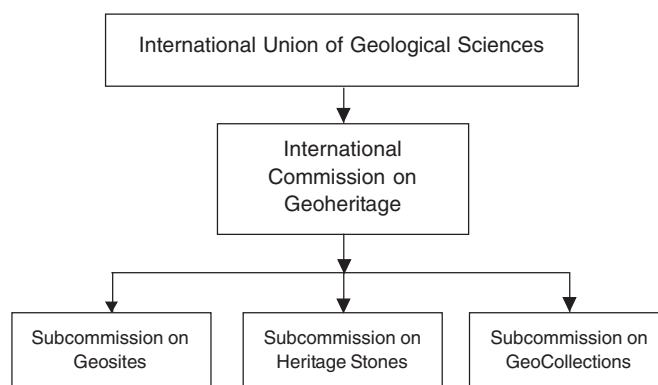


Fig. 2. Rejuvenated International Commission on Geoheritage (ICG) with three subcommissions in 2022.

International Commission on Geoheritage in 2022

Since its creation in 2016, the rejuvenated ICG has grown into a powerful commission. The ICG now has three dedicated subcommissions, viz., Subcommission on Geosites, Subcommission on Heritage Stones, and Subcommission on GeoCollections (Figure 2). A revised uniform Terms of Reference (2022) will govern all three subcommissions of the International Commission on Geoheritage.

Heritage Stone Subcommission

The Heritage Stone Subcommission is the result of the hard work of the former IUGS-Heritage Stone Task Group (HSTG) and its affiliate, the International Association of Engineering Geology and the Environment (IAEG). At the 33rd International Geological Congress in Oslo, Norway, the project “Global Heritage Stone Resource” with links to IAEG Commission C-10 Building Stones and Ornamental Rocks set the groundwork for the current Heritage Stone Subcommission. The project “Global Heritage Stone Resource” was raised to an IUGS-Heritage Stone Task Group for four years during the 34th IGC in Brisbane, Australia (Cooper, 2010; Cooper et al., 2013; Pereira et al., 2015a, b; http://media.globalheritagestone.com/2015/09/HSTG-Statutes_Jul12.pdf). Finally, during the 35th IGC in Cape Town, South Africa in 2016, the Heritage Stone Subcommission was founded as a subcommission of the International Commission on Geoheritage (Pereira and Page, 2017; <https://globalheritagestone.com>).

Natural stones that have played a significant role in the world’s major stone-built architecture, with linkages to our cultural ethos, are being identified and recognised by the Subcommission on Heritage Stones (<http://globalheritagestone.com/>). Through the “Global Heritage Stone Resource” (GHSR) classification, the IUGS Heritage Stone Subcommission (HSS) aims to promote geological knowledge,

usage, and conservation of culturally, architecturally, and historically significant natural stones around the world. “A Global Heritage Stone Resource (GHSR) is a designated natural stone that has achieved widespread use and due recognition in human culture over a significant historical period” (<http://globalheritagestone.com/reports-and-documents/terms-of-reference/>; Kaur et al., 2020a and references cited therein).

Important Achievement of HSS: IUGS-Global Heritage Stone Designation (a global geological standard)

The IUGS-GHSR recognition bestowed on some of the world’s most notable heritage stones is a result of the Heritage Stone subcommission’s former and current board, voting experts, and correspondents working together under the leadership of ICG and IUGS-EC. The idea of designating noteworthy building/dimension stones as Global Heritage Stone Resources arose from the fact that natural stones have been used in human cultures to create significant artistic and architectural monuments and buildings that reflect our cultural evolution, and that these natural stones should be internationally recognised and accredited based on certain criteria (Table 1; http://media.globalheritagestone.com/2015/09/HSTG-Statutes_Jul12.pdf; <http://globalheritagestone.com/reports-and-documents/terms-of-reference/>). The worldwide identification will give the stone a distinct identity and value (Cooper, 2010; Cooper et al., 2013; Pereira et al. 2015a, b; Pereira and Page, 2017; Pereira and Cardenes, 2019; Pereira 2019; Hannibal et al., 2020; Kaur et al., 2021a, b, c, d and references cited therein).

To summarise, the GHSR accreditation is important in highlighting the stones as a valuable natural resource sourced from the earth and used in heritage buildings and monuments, requiring a thorough understanding of the stone’s attributes, geological history of formation, source quarries, quarrying

Table 1. List of proposed criteria for designation of IUGS Heritage Stone (modified after http://media.globalheritagestone.com/2015/09/HSTG-Statutes_Jul12.pdf; <http://globalheritagestone.com/reports-and-documents/terms-of-reference/>)

S. No.	Criteria	Description
1	Significant Cultural relevance	An assessment of historical and archaeological use, reflecting relevance in cultural evolution. Wide-ranging application, or extensive use during a historic period (Baroque, Renaissance, Gothic, Persian-Islamic, UNESCO designated cultural sites etc.). Traditional and indigenous beliefs and cultural practices related to the stone should be taken into account.
2	Stone Built Heritage sites	Iconic monuments synonymous with the cultural identity of a particular time period.
3	Architectural value	Common recognition as a cultural icon, potentially including association with national identity or a significant individual contribution to architecture.
4	Geological setting	A description of the stone/stones location (geo-coordinates), geological map, geological setting together with geological age, petrographic name, stratigraphic name.
5	Petrographic and technical description	Full petrographic description of the stone/ Technical/Physico-Mechanical properties (description of analytical methods, with full references if the stones have not formed part of the proposer’s own research). Mineralogical and Geochemical characterization. Mineralogical variations when different varieties of the stone are explained.
6	Quarries	Account of all known functional and historical quarries of the stone with geological map. Ongoing availability of material for quarrying, including the historical quarries that are not active and have been preserved.
7	Societal relevance	Potential benefits to society, such as development of touristic infrastructure, preservation of local traditions, enhancing the cultural and social heritage of the area.
8	Scientific relevance	Benefits coming from research and scientific knowledge, which can be used for restorers and architects to restore buildings where the same Heritage Stone is suffering from weathering and destruction.
9	Present use	List of functional/present day uses of the stone (if any).

history, and conservation measures. (<https://iugs60.org/geoheritage/>).

Heritage Stone Subcommittee Working Group

HSS board members (Chair, Vice-Chair, and Secretary), voting members, and correspondents make up the HSS working group. The HSS working group's main task is to identify natural stones from around the world and propose them for IUGS-Heritage Stone designation after thoroughly evaluating them against the requirements for IUGS-Global Standard for Heritage Stones designation. The current HSS board revised the criteria for designation after consulting with voting members and the IUGS-ICG Executive committee. Table 1 lists the recommended criteria requirements for the designation of an IUGS heritage stone.

The GHSR designation can have a significant bearing in the fields of geology, engineering, architecture, cultural studies, historical quarries, modern-day functioning quarries, architectural heritage conservation and restoration, and so on (Cooper, 2014; Pereira et al. 2015a, b). It also acts as a fantastic outreach activity outside the geological realm, whereby the general population is made aware of the existing geological legacy and encouraged to participate on a larger scale in protecting and celebrating it. The following text (a-f) is a collaborative effort of the current HSS voting members, emphasising possible major outcomes of the IUGS Heritage Stone designation (modified from http://media.globalheritagestone.com/2015/09/HSTG-Statutes_Jul12.pdf and <http://globalheritagestone.com/reports-and-documents/terms-of-reference/>).

- a. raising the profile of many natural stone materials to greater prominence through further research and publications. Professional recognition for, and understanding of, natural stones in the areas of geology, archaeology, engineering, architecture, and stone/building conservation and restoration.
- b. increased community, national, regional, and international awareness of natural stones and their widespread utilisation within human history and culture. International cooperation in research, including the dissemination of information on the utilisation of natural stone resources as building and ornamental stones.
- c. documentation of significant positive attributes of natural stone in terms of sustainability. Developing and maintaining a platform to define and formalise selected characteristics of natural stone material, for professional purposes and otherwise, in an internationally accepted context.
- d. safeguarding and protecting heritage stone resources (historical quarries) from subsequent annihilation by alternative human endeavour or natural causes, and hence also providing a resource to conservation/restoration professionals who seek out same or similar stones for building/building element restoration purposes. Proper management of well-known existing natural stone extraction operations in order to ensure future availability and utilisation, and to avoid as much as possible exhausting the particular resource.

- e. Fostering Industry–academia partnerships in geotagging important ancient quarries and encouraging conservation and protection of these sites.
- f. Raising and enhancing awareness among young students in particular, and the general public in general, about heritage stones. The heritage stones used in heritage buildings and monuments act as educational resources for geologists, students, and the general public, since they illustrate local and regional geology, small-scale petrographic characteristics, and, consequently, the diversity of rock types that can be found in the surrounding countryside. Also, imported stones act as a starting point to promote discussions about their origin and the reasons for their being part of these buildings and monuments.

Procedure for IUGS-Heritage Stone designation

From 2022 onwards, the designation “Global Heritage Stone Resource” will be replaced by “IUGS-Heritage Stone.” Recognizing a natural stone as an “IUGS-Heritage Stone” will entail a series of actions guided by the procedure and criteria developed by the Heritage Stone Subcommittee board and voting members in cooperation with the ICG management. The updated approach and criteria for the IUGS-Heritage stone designation will be available soon on the ICG website, which is set to launch soon.

GHSR: Global Scenario

There are twenty-two (22) stones from various parts of the world that have been designated as Global Heritage Stone Resources (<http://globalheritagestone.com/other-projects/ghsr/designations/>; <https://iugs60.org/geoheritage/>; Kaur et al., 2020a and references listed therein). To date, eighteen stones from Europe (Lioz Stone; Estremoz Marble; Villamayor Stone; Alpedrete Granite; Welsh Slate; Bath Stone; Macael Marble; Portland Stone; Lede Stone; Petit Granite; Larvikite; Rosa Beta Granite; Pietra Serena; Carrara Marble; Hallandia Gneiss; Lower Globerigina Limestone; Podpec Limestone; Kolmarden Stone; Makrana Marble), two from North America (Tennessee Marble; Jacobsville Sandstone) and one each from South America (Piedra Mar Del Plata) and Asia (Makrana Marble) have been accredited as IUGS-GHSRs. However, there are numerous deserving stones that have yet to be included in the current GHSR list. IUGS-ICG-HSS is working hard to recognise stones from all around the world for their architectural, historical, and cultural significance. Ten new GHSRs will be added to the existing list by the end of 2022.

Contribution of UNESCO-IGCP in Promoting the Activities of Heritage Stone Subcommittee

From 2015 to 2019, the Heritage Stone Subcommittee successfully completed the UNESCO-IUGS-IGCP-funded IGCP-637 project on Heritage Stone Resource designation (Pereira, 2021). Many objectives were met as a result of this initiative such as designating IUGS-GHSRs, organising workshops and seminars on heritage stones. Many special volumes on heritage stones were published in international journals like *Episodes*, *Geoheritage*, and the *Journal of the Geological Society*

of London. The second IGCP 637 on Heritage Stones Recognition: A Step Forward (HerSTONES) is a spin-off of the preceding project with the goal of increasing the number of Heritage Stones recognized. The project is focused on identifying stones from emerging countries.

Heritage Stones from India

After a nearly three-year hiatus, the Heritage Stone Subcommission is ready to resume the process of IUGS-Heritage Stone designation. Earth scientists from developing countries should collaborate and communicate with the IUGS-Heritage Stone Working Group in order to promote their countries' national heritage stones. India is one such country which deserves many IUGS-Heritage Stone designations (Kaur et al., 2019a, b; Kaur et al., 2020a, b, c, d; Kaur et al., 2021a, b, c; Sreejith et al., 2021; Garg et al., 2021). Makrana Marble from India was designated a GHSR in 2019 and is part of the list of designated 22 heritage stones from around the globe (Garg et al., 2019). The Geological Society of India is organizing an International Seminar on Ancient Buildings and Rock Weathering in December 2022 to support the concept of Heritage Stones.

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Weblinks

- <http://globalheritagestone.com/other-projects/ghsr/designations/>
- <https://iugs60.org/geoheritage/> (accessed on 5th April 2022)
- <http://globalheritagestone.com/reports-and-documents/terms-of-reference/> (accessed on 5th April 2022)
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