Book review

Sustainable Use of Traditional Geomaterials in Construction Practice

R. Přikryl, Á. Török, M. Gómez-Heras, K. Miskovsky and M. Theodoridou (eds). The Geological Society, London, UK, 2016, Special Publication 416, ISBN 978-1-86239-725-5, £120.00, 310 pp.

Geological Society Special Publications have, since 1984 when they were given their own identity, become renowned throughout the global geoscience community for their high quality of science and production. These publications represent a state-of-the-art treatment of their subjects that, by their very nature, have very specialist target audiences.

This volume contains 22 research papers prepared by academic geologists from almost every European country, except the UK, with a number of papers from Spain, Italy, France and Greece. The papers are grouped into four themes

- sustainability issues
- sources and performance of local natural stone
- properties and durability assessment of natural stone and aggregates
- weathering and conservation of geomaterials.

Geomaterials are inorganic materials derived from the Earth's crust and are used for construction after appropriate processing. They have been used since the earliest days of civilisation, and a few of the papers review early quarrying and the use of stone for the construction and embellishment of buildings. For these early builders, it was the accessibility and ease of use of the stone that were primary functionalities rather than durability. In modern times, with the extensive mechanisation of quarrying and processing, the principal functionalities are described as: the ability of the stone to respond to those processes, remain durable not only under weathering but also on exposure to pollution by air and water-borne chemicals and particulate matter, and its ability to be processed and transported with the minimum of energy usage. In order to use them properly, the obvious conclusion was that this requires a full understanding of their properties and interaction with other components in the structure so that they can prolong the life of the construction and contribute to minimising energy demand. Many of the papers detail their relevant properties in particular applications. Unsurprisingly, a strong

correlation was found between the cost of a geomaterial and the volumes utilised.

Quarrying involves major challenges to provide the quoted 22 billion tonnes of aggregate per annum used worldwide. The authors observe that sustainability should address issues including the traffic generated, the emissions and energy use connected with transportation, proper targeting of use to requirements and the environmental impact and considerations of land use and employment. There is said to be increased awareness in the countries represented that extraction is a non-sustainable activity, and it is recommended that policies be developed to place much more emphasis on the reuse and recycling of geomaterials.

A short paper from Italy draws attention to the need to improve the recycling of the sludge formed during dimensioning of stone. It outlines the tests required to detect contaminants and suggests suitable uses of the sludge as fillers, artificial soil and, after mixing with (for example) clay, waterproof liners.

Many of the papers discuss the durability and reuse of local stone in local building and renovation applications, and may be useful as case studies on methodology as many of the technical details are specific to the location in question. An interesting practical paper describes the use of geographic information system mapping in the Paris Basin, linked to the properties of stone, which can be used by architects and others to rapidly identify suitable materials for particular applications.

There is little geological information to be obtained from the current European standard for aggregates (EN 932-3), which is limited to a simplified petrographic description, together with the name of the rock and its mineralogical composition. Swedish research concluded that while this may be sufficient for a preliminary investigation, for sustainable exploitation, knowledge of the results of the mechanical tests contained in EN 1097 is required.

The papers have been written by academic geologists, but the intention of this compendium is to bring the four themes of the book to the attention of those working in cultural heritage, monument conservation, civil engineering and architecture.

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