



Wall Building Bibliography

Building Advisory Service and Information Network

Selected Bibliography on Stone as a Building Material in Development Countries

Introduction

An increasing awareness for the use of dimension stone in building construction can be noticed nowadays in developing countries. It is, however, surprising that for an age old material like stone, information material is rather scarce and not readily available in a convenient form. Information on stone has normally to be culled from books on the earth sciences, and the related technology and application from books on building.

Since little has changed in stone materials, even the most recent publications lean heavily on what has been practised and written in the past. New publications mainly contribute on methodology interlaced with appropriate technologies.

This select bibliography begins with general publications which cover various disciplines concerned with the use of stone. Thereafter follow building manuals and publications which cover stone extraction and working, equipment, case histories, stone qualities, glossaries, preservation, technical briefs, dry walling, UN-publications, standards & specifications, and professional and/or trade journals. Some entries which deal with informal stone architecture are included, as these offer a wealth of practical advice on how to put up stone dwellings. Cross reference is made where a publication emphasises on more than one category, e.g. in quarrying and stone working. In the list of journals either e-mail or subscription addresses are given. The journals are more concerned with industrial and architectural aspects of stone development. However, they also contain a wealth of information on appropriate equipment which is especially suitable for small and medium scale enterprises, and are therefore very useful for organisations and enterprises which promote the use of building stone.

Few books deal with small scale stone quarrying. Appropriate information is available in the stone literature with special reference to developing countries and in some case studies which are also concerned with environmental problems. This situation is similar regarding stoneworking: publications on modern practical masonry are a combination of textbook and manual. A section on preservation is added since the subject material offers information on qualities of stone materials. Furthermore an increasing importance is nowadays attached to heritage preservation.

Information material on standards is regarded as very important. Unfortunately there is very little specialised information available on the behaviour of stone walls under earthquake conditions. Likewise global case studies on this subject are missing.

The bibliography refers to literature published in the English language, although a few books which have been issued in other languages are also included.

General Publications

The books listed in this sections are not specifically addressing the needs of developing countries but offer useful information on regional stone sources and practices:

1. "The Development Potential of Dimension Stone": by Asher Shadmon; UN, New York (ST/ESA/34), U.S.A., 1976, pp. 95; sales no. E76II, A.4. The book has also been translated into French (pp. 106), sales no. F76, II A4; and Spanish (pp. 105), sales no. S76, II A4.

Emphasis is laid in this book on the labour intensive nature of stone working, its suitability as a cottage industry or as a seasonal occupation together with subsistence agriculture. Many illustrations show the extraction and stoneworking methods used in developing countries (Fig. 1). A glossary of technical terms is included in the languages of the three different editions. This publication was the first of its kind and deals with the development potential of dimension stone rather than with the use of stone in informal building. It can be regarded as a forerunner of a series of other publications.

2. "La Pierre":

by Carayon, Bernard; Gardet, Jean & Berthoumieux, Guy-Lucien; GRET (Production et a Mise en Oeuvre dans l' Habitat), Paris, France, 1984; pp. 248; ISBN 1-211-0848197.

Besides touching on the development potential of stone this book includes in addition detailed and well illustrated applications of stone in informal building construction, mainly in Africa.

3. "Moving Heavy Things":

by Adkins, Ian; Berkeley Typographers, Boston, U.S.A., 1980; pp.48; ISBN 0-395-29206-9.

This well illustrated brochure explains in very practical terms how, and with which kind of tools masons, monument builders and architects can move unwieldy and very heavy loads from one place to another with simple basic techniques on the basis of multiplying strength and easing burdens.

Building Manuals

1. "House of Stone":

by Watson, Lewis and Sharon; Stonehouse Publications, Sweet, Idaho 83670, U.S.A., 1998; pp. 96; ISBN 0-9803236-1-9.



Fig 1: Squaring Kotah stone in India

This practical book explains "step by step" how to build a house with stone. The simple construction and forming techniques described require no previous masonry experiences.

2. "The Stonebuilders Primer":

by Long, Charles K.; Camden House Publishing Ltd., Camden East, Ontario, Canada, 1981; pp. 127; ISBN 0-920656-20-X.

This very well illustrated primer is concerned with keeping costs of building a house with stone within a limited budget by concentrating more on traditional stone masonry and less on the "slipform" method.

3. "Building with Stone":

by McRaven, Charles; Storey Communications, Inc., Pownal, Vermont 05261, U.S.A., 1989; pp. 92; ISBN 0-88266-550-2.

The book is suitable for the beginner in this field and also for improving the know-how of a more seasoned craftsman. Especially useful are the last 20 pages which deal with restoration and upgrading of dwellings. It is fully illustrated with neatly drawn diagrams, well indexed, and contains a glossary of technical terms which are used in the book.

4. "Stone in Building":

by Ashurst, John and Dimes, Frank; Architectural Press, London, U.K., 1978 (reprint by Stone Federation of Great Britain, London, U.K. in 1984); pp. 172; ISBN 0-85139-607-0.



Fig 2: Stone aggregate production in India

The book surveys various different types of building stone and offers advice on their possible usage. Many sketches and illustrations explain details of construction methods.

Stone Extraction

1. "Stone - An Introduction":

by Shadmon, Asher; IT-Publications, London, U.K., 1996 (2nd edition); pp. 172; ISBN 1-85339-313-4.

The book contains a basic introduction to stone for local use in building. It covers stone resources, extraction and working, production and building applications, and provides a link between basics and high-tech developments. It is useful for the geologist as well as for the stone user, whether architect or "do-it-yourself" builder.

Stone Working

1. "Modern Practical Masonry":

by Warland, E.G.; Pitman, London, U.K., 1924 (reprinted by Stone Federation, London, UK in 1953); pp. 270.

This is the standard book on traditional loadbearing methods used in stone building construction. Its contents are very useful for the actual stone worker and apprentices, and less to planners or supervisors. There is limited information on restoration.

2. "Practical Stone Masonry":

by Hill, P.R. and David, J.C.E.; Donhead Publishing, London, U.K., 1995; pp. 276; ISBN 1-873394-14-4.

The book is in a way complimentary to "Modern Practical Masonry", but it pays more attention to sociological and human resources issues, such as training. It also contains an extensive glossary of architectural terms.

Equipment

1. "Guide to Tools and Equipment (for labour based road construction)":

by ILO, Geneva, Switzerland, 1981; pp. 478; ISBN 92-2-102539-X.

This is a well indexed guide which is directed to road construction using stone. It contains a wealth of useful ergonomic information on the use of suitable tools and equipment which are also used in building with stone, especially with small-scale construction methods. Of particular importance are the references to the acceptance of testing procedures for equipment and its maintenance, and on how to advice local manufacturers on the production of necessary tools and equipment.

Case Studies

1. "Innovating a Clean Technology for Mining Kotah Stone and Sharing the Gains:

by Agarwal, S.C.; First World Mining Environment Congress, New Delhi, India, 1995; pp. 687-702.

This case study focusses on the utilisation of quarry waste with innovative technology in Kotah, Rajasthan in India. It shows how stone recovery in the quarry has improved from 24 % to 80 % by reducing quarry waste proportionally (Fig. 2). This has in turn increased the overall productivity to 150%, and the life of the quarry reserve 2.5 times. The fact that the quarrying operation is labour intensive (at times up to 5000 workers are employed in Kotah) underlines the significance of this case study.

Stone Quarrying

1. "Stone quarrying in Kenya - a socio-economic and institutional survey":

by Agevi, Elijah and Ogero, B.B.; IT-Development Group, Mining Programme, P.O. Box 39493, Nairobi, Kenya; pp. 70 (unpublished).

This is an in-depth survey of a local building stone quarrying industry in Kenya. It analyses the problems which are encountered in the operations. These include correct pricing, promotion of the material, legislative aspects and human resources management (Fig. 3 & 4).

Stone Qualities

1. "Building stone, rock fill and armour stone in construction":

by Geological Society, London, U.K., 1999, Engineering Geology Special Publication; pp. 478; ISBN 1-86239-029-0.

A reference book which provides a comprehensive and well illustrated up-to-date presentation of all aspects of the use of stone and rock for engineering and building purposes.



Fig. 3: Tuff quarry in Kenya

2. "Designing with Stone":

by Burton, Muriel (ed); Ealing Publications, Maidenhead, U.K., 1996; pp. 218; ISBN-0-910117-3-1.

Recommendations and methods for the choice of suitable stone for building are brought together with model specifications and current acceptances. The reference section summarises available information on international tests and standards, on information sources, and stone identification. In addition the book contains a well detailed index.

Glossaries

1. "Natural Stone Glossary":

by Stone Federation, London, U.K., 1991; pp. 132.

This is a very useful glossary with cross-references, which contains over 8000 terms on geological aspects, quarries, tools and equipment, stonework, operations, stone dressing, architectural aspects, etc. The first 62 pages are concerned with weathering of building stone, quality assurances and stone varieties in the U.K.

2. "Stone Industry Technical Glossary":

by Giornetti, Massimo; Italian IMM, Carrara (MS), Italy, 1991; pp. 87.

This bilingual (Italian/English; English/Italian) glossary contains trade terms and is very useful for studying equipment and technical catalogues in Italian. It also contains some terms which are not included in the Stone Federation Glossary, as well as a number of useful illustrations.

3. "Naturstein Lexikon":

by Mehling, Günther (ed); D.Callwey Verlag, München, Germany, 1999; pp. 1980; ISBN 3-7667-1054-0.

This glossary in German is perhaps the most complete if not unique mini-encyclopedia in "Larousse" style available on stone. It is also well illustrated, and covers extensive details which are useful for artisans and industrial technicians alike.

Preservation

1. "Weathering of Natural Building Stones":

by Schaffer, R.J.; Building Research Establishment (BRE) in Watford, U.K., 1926, (reprinted 1972); 1-X pp. 149.

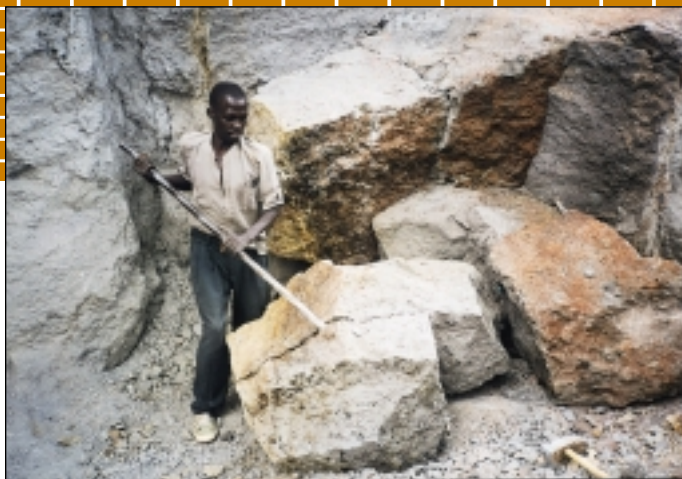


Fig. 4: Splitting tuff for building stone in Kenya

This is a "classic" book which reviews in simple terms the effects of weathering on stone. It is illustrated with photos from actual projects. Chemical, physical and mechanical phenomena are discussed. Chapters on living organisms as agents of decay, preventive and remedial measures, and testing methods are valid today as they were at the time when the book was first published.

2. "Conservation of Building and Decorative Stone":

by Ashurst, John and Dimes, F.G.; Butterworth-Heinemann, London, U.K., 1996, 2 vols.; pp. 254+193; ISBN 0-7506-1269-X; ISBN 0-7506-1277-O.

This is a well illustrated introduction to restoration and repair of stone buildings, weathering and decay of stone, cleaning and surface repair, etc. The first part of the book explains the geology of Great Britain, and the use of building stone in this country. The publication can be regarded as a major reference book with a practical background.

Technical Briefs

1. "Stone Walls in Mountainous Regions":

2. "The Use of Natural Slabby Stone Deposits for Wall Construction":

3. "The Boulder Concept in Building Walls":

all three briefs by Shadmon, Asher; BASIN at GATE/GTZ, P.O. Box 5180, D-65726-Eschborn, Germany; 1997; pp. 4 to 6.

These technical briefs contain basic information on special types of stone and their application. They describe how these stones can be used for building with easily acquired skills, wherever the sources are readily available. They can be regarded as an introduction for those who would like to build with stone using appropriate technology. The illustrated briefs describe stone resources, location, identification, extraction and production, application, practices, and offer short explanations of the terms used (Fig. 5).

Dry Walling

1. "The Forgotten Art of Building a Stone Wall":

by Fields, P. Curtis; Yankee Inc. Book Department, Box F, Dublin, NH 03444, U.S.A., 1975, pp. 24.

This is a concise, well illustrated guide to dry wall construction, describing practical methods for building new and rebuilding old stone walls.

2. "Drystone Walling":

by Hannay, F. Rainsford; Stewartry of Kirkcudbright Drystone Dyking Committee, Gatehouse of Fleet, Faber and Faber (3rd edition), London, U.K., 1976, pp.106.

3. "Drystone Dyking":

by Cairns, Robert; Biggar Museum Trust, U.K., 1984, pp. 33.

4. "Drystone Walls":

by Garner, Lawrence; Shire Publications, Buckinghamshire, U.K., 1995.

The last three listed publications describe techniques used for dry stone walling which have been and can be used for retaining walls and shelters in developed and developing countries (Fig. 6).

UN- publications

Various UN offices in different developing countries have published several stone project reports. Some of them have been periodically issued. These include:

1. "Marble in the Philippines":

UN, New York Bureau of Mines; Manila, Philippines, 1969; pp. 62.

2. "Stone in Nepal":

UN, New York, Department of Mines and Geology; Kathmandu, Nepal, 1977; pp. 64.

3. "Stone in Haiti":

UNIDO, Vienna, National Institute of Mineral Resources; Port au Prince, Haiti, 1980; pp. 64; No. 80-39964.

4. "Stone in Brazil":

UNITAR, New York, U.S.A., 1988; sales no. E88 111k RR35.

5. "Stone in Southern Africa (11 SADC Countries)":

by Oosterhuis, R.; UNESCO Publishing/ Faenza Editrice, 1999, pp. 64; ISBN 88-8138-D44-7.

These five reports have a similar general synopsis designed to serve as inventories and national stone development master plans. Each of them includes sections which describe traditional



Fig. 5: Slab stone haulage in Kotah, India

stone extraction and dressing practices, as well as use of stone with particular reference to the application of appropriate technologies. In the local context standards for and properties of indigenous stone varieties are described. "Marble in the Philippines" has sections on stonecraft and also "piedra adobe" technologies. "Stone in Nepal" describes appropriate extraction technologies. "Stone in Haiti" emphasises on appropriate stone working methods and explains the production of paving slabs besides field stone technologies. "Stone in Brazil" makes special mention of the boulder concept, especially in combination with the use of granites and describes the technology used (see also BASIN/GATE-TB08). In addition the advantages of extracting stone with diamond wire as compared with other methods are mentioned.

Standards and Specifications

1. "Standards and Specifications for Local Building Materials":

Report of the ARSO/CSC/UNCHS Workshop, Nairobi, Kenya, 1987; IT-Publications, London, U.K., 1987; pp. 45; ISBN 0-94668879-6.

This report was published by IT-Publications on behalf of the African Regional Organisation (ARSO), the Commonwealth Science Council (CSC), and the United Nations Center for Human Settlements (UNCHS/ Habitat). It is an introduction to the issues and problems of necessary standards and specifications for informal building. The report deals with local building materials, although it does not specifically refer to stone. However

it highlights the problems involved in the production and use of local building materials and indicates possible solutions.

Journals on Stone

1. "Asia Stone Link":

12 Aljunied Rd., # 04-02 SCN Centre, Singapore 389801; bi-monthly.

2. "Building Stone Magazine":

P.O. Box 507, Purdys, NY 10578, U.S.A.;

3. "L'informatore del Mamista":

Giorgio Zusi Editore, Via Gaspari Spontini 1, I-37131 Verona, Italy; e-mail: zusieditore@iol.it; monthly.

4. "Marmomacchine":

Edizione Promorama, Via Cenisio, 49-20154 Milano, Italy; bi-monthly.

5. "Mausolee le Zac":

Les Chassagnes, F-69360 Ternay, France; monthly.

6. "Naturstein":

Ebner Verlag GmbH, Postfach 3060, D-89020 Ulm; email: naturstein@ebnerverlag.de; monthly.

7. "Natural Stone Specialist":

Herald House Ltd., 96 Dominion Rd., Worthing, W. Sussex BN148 JP, U.K..



Fig. 6: Dry walling from stone in the Lake District, England

8. "Roc Maquina":

Edificio Enecurt Oficinas (M2-10), 48950 Asua Erandio (Vicaye), Spain; e-mail: rocmaquina@sarenet.es; quarterly.

9. "Rochas & Equipamentos":

Rua das Enfermeiras da Grande Guerra, 14A, P-1170 Lisboa, Portugal; e-mail: rochas.equipamentos@ip.pt; quarterly.

10. "Stein":

Callwey Verlag, P.O.Box 1241, D-82412 Murnau, Germany; e-mail: info@stein-netz.de; monthly.

11. "Sten":

Stenutveckling Nordiska AB, Box 50, S-13222 Saltsjö-Boo, Sweden; e-mail: stenut@stenutveckling.se; bi-monthly.

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What is basin ?

The building advisory service and information network (**basin**) - of which GATE/GTZ is one of the founding members - was set up in 1988 to provide information and advice on appropriate building technology and to create links with know-how resources in the world for all those in need of relevant information.

basin attaches importance to giving individual specialised support to its clients whilst balancing this with the comprehensive view that comes from the long and diverse experience of its partner organisations.

basin provides a comprehensive range of expertise, experience, knowledge and skills for the support of new initiatives in the low-cost building sector.

basin is a service available to all institutions and individuals concerned with housing, building and planning in developing countries, but can only function efficiently, if there is a regular feed-back. Any publications, information, personal experiences, etc. that can be made available to **basin** are always welcome and will help **basin** to help others.

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